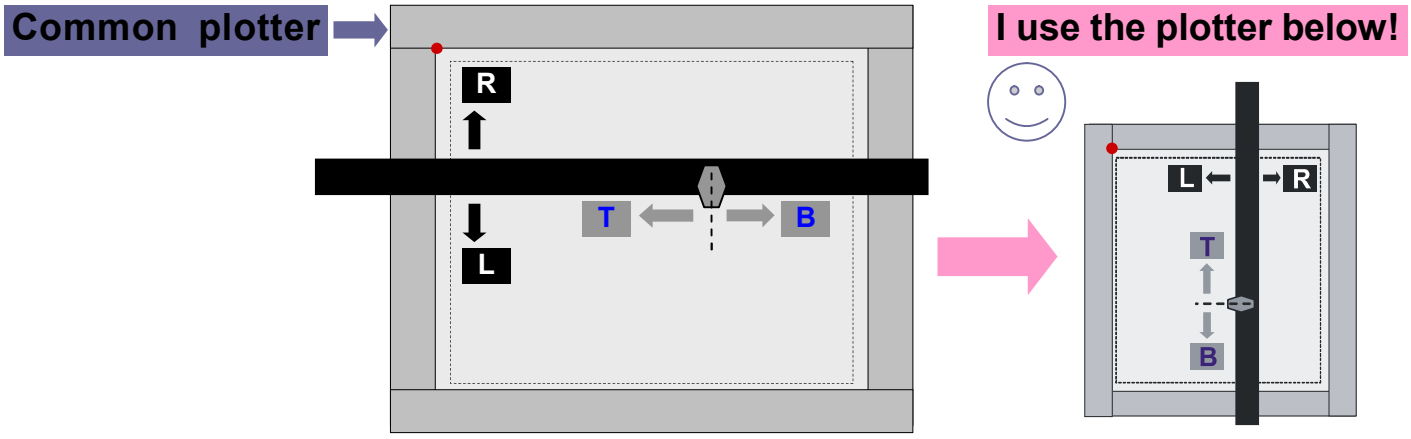
LHYMicro-GL2

Lihuiyu Microcode Graphic Language-2(Abbreviation: LHYMicro-GL2)

- Prime objective: Quickly execute it on low-level mcus.
- Fixed data(or command) packet:
  Header(byte(0)) + data(fixed 30bytes) + CRC8
  CRC8 formula: CRC8 = X8 + X5 + X4 + 1
  If Length(data) < 30
  {
  (1). data = data + (30 - Length(data)) x char('F')
  (2). data = data + (30 - Length(data)) x byte(0) {ATxx commands only M3}
  }
- Instruction set



#define IntToAnsi_3 (int 023) return '023'
#define IntToAnsi_1 (int 2) return '2'

A: Register device, 3Party App ignore it

I: if not Running: Initialize system, ram and data pointers e.g.., set 0
if Running: Stop. send 0x0+IFFF……CRC8(stop run and exit program)

C: Set run mode is cutting, otherwise is engraving
Example1: IV……..(engraving initialize)
Example2: ICV……..(cutting initialize)

G: if is engraving, set pixel pitch
Examples: G001……G015
G000G0xx(xx=00-15): unidirectional scan

D: Laser ON

U: Laser OFF

L, R, T, B: Move X or Y(if M only set direction): Down(L), Up(R), Left(T), Right(B)
Example: R056T072(move up 56 steps, move left 72 steps)

M: both move X and Y
Example: RBMz168L096(move up-right 255 + 168 steps, and move down 96 steps)

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V: set moving speed(mm/s)
    const Delta[4]={0x8, 0x1400, 0x1600, 0x1800};
          millimeterPerStep = 0.0254mm; //default
          MCUCLK = 22118400;
   {
      int n = 1;
      if speed > 320.0mm/s
         n = 3
      else
      if speed >= 127.0mm/s
         n= 2
      else
      if speed < 7.0mm/s
         n = 0;

      If speed >7.0mm /s
         TSpd = word(65536 - MCUCLK * millimeterPerStep/speed)
      else
         TSpd = word(65536 - MCUCLK * millimeterPerStep/speed/12);
      TSpd = TSpd –Delta [n];

      ////////Set moving speed data(VD)
      VD='V'+IntToAnsi_3(TSpd_H)+IntToAnsi_3(TSpd_L)+IntToAnsi_1(n+1);
      DynClks(custom) : Motor-plus dynamic clock adjustment
      if iscutting then
        VD = VD + IntToAnsi_3 (DynClks_H) + IntToAnsi_3 (DynClks_L);
  }
```

S1PF: if not Running: Move to (x, y)

Example1: IR…….B……S1PF

Example2: 0x0+IRzz096Bz078S1PFFFFF…….CRC8

(move up (255 + 255 + 96) steps, move right (255 + 78) steps)

Return: CH341 Pin6: low level 390ms (M2 no return)

IS2PF: if not Running: Unlock motors

Example: 0x0+IS2PFFFF……CRC8

PN: if Running: pause/resume

Example: 0x0+PNFFFF……CRC8

IPP: if not Running: Reset device to home

Example: 0x0+IPPFFFF……CRC8

S: Set can start flag(but not always execute)

Example: Rz080Tz|kSE(default) Rz080Tz|nS….E (continue buffering data until E)

S0: Set can start flag and set mode 0, 3Party App ignore it

S1: Set can start flag and set mode 1
Example: S1E or S1UE

E: Execute
See above S1
Note: if is Engraving(or Cutting) then PCB EX+ go High-level.
EX+ EX- drive a optocoupler(such as moc3043/3063/3083) for control pump and air assit……

N: Quick skip blank area(set skip-blank flag)
Example: NRzz064T059SE
See below: N…….SE and NSE

NSE: Quick skip blank area
Example: @Lzzzzz141Tzzzz054NSE
NSE: Motors is standstill
N…….SE: Motors is driving

FNSE: Program finished and enter idle
Return: CH341 Pin6: low level 390ms
Note: Delay 90s, PCB EX+ set Low-level, close pump and air assit……

@: attach next task data to previous task
Example: IV…..@Lzzzzz080TzzzbNSECV……@.....FNSE

W: Set Laser Power(W000 .. W999)
Example: IV……W500 (Set Laser Power is 50.0%)
Note: only M3 and fireware up 2024.01.18g support set laser power
Earlier M3 only is M2+

////////Bytes reduce

a..y: '001' - '025'
Example: Rx = R024

|a..|z: '026' – '051'
Example: L|ba = L027001

z: '255'
Example: Bzb = B255002

//////ATpacket = 0x00AT……0x000x000x00 + CRC8(only M3 support AT commands)
AT0: Shot laser(data is Immediate number)
Example: AT00xHH0xLL0xtt (0xHHLL =(0 - 999), 0xtt(1-256ms))

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AT00: Disable shot laser(disable only once, press multifuctions-button to cancel)
Return: CH341 Pin6: low level 256ms
Note: before app wait for user press multifunctions-button, send AT00
such as 0x0AT000x00x0…..CRC8

AT01: Send hardware info, 3Party App ignore it

AT1: if not Running: Modify PWM register(data is Immediate number)
Example: AT10x0 0x64 (Set Laser power = 10.0%, but not save to Flashrom)

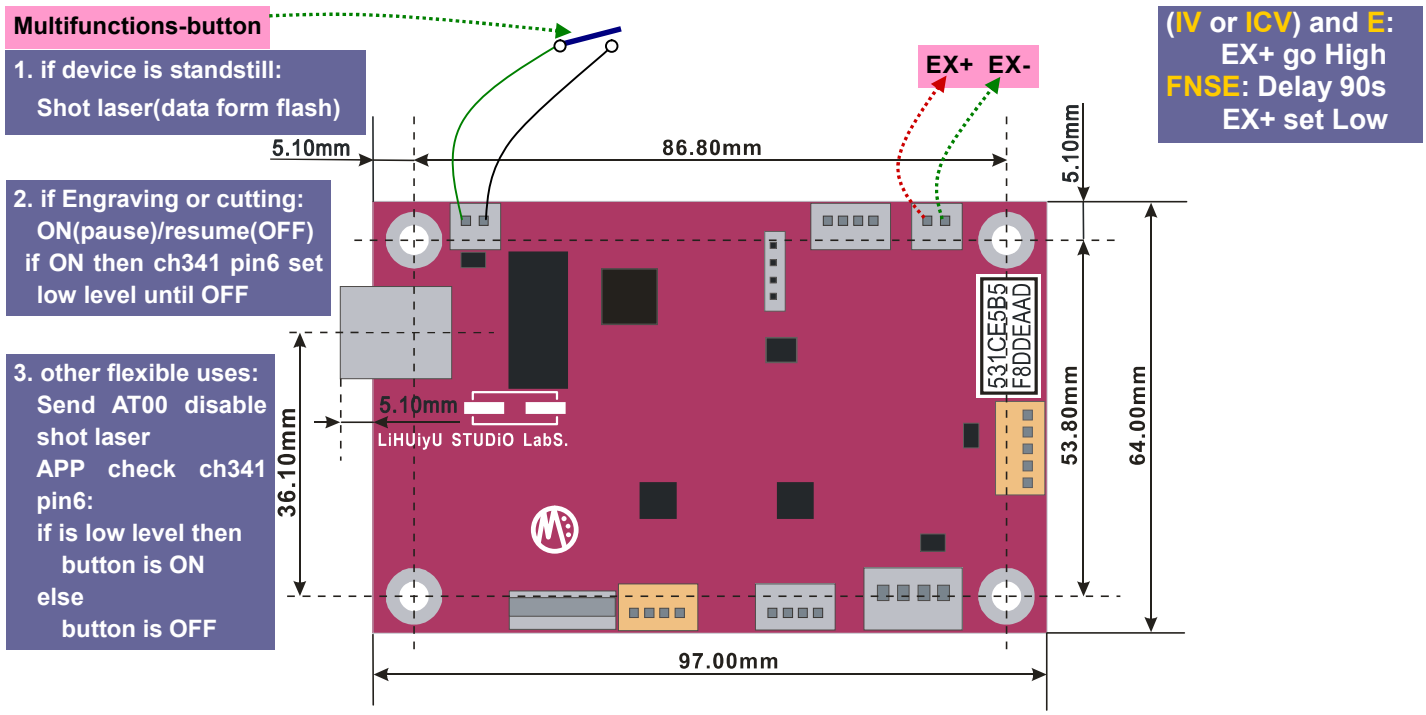
AT2: set hardware params(data is Immediate number, save to Flashrom)
Format: AT20xaa0xbb0xcc0xdd0xee0xff0xgg0xhh0xii
0xaa(0x0 or 0x1): enable/disable device reset to home
0xbb(0x0, 0x1, 0x2): X-axis extra acceleration
0xcc0xdd: skip-blank area speed
0xcc0xdd = Word(65536 - MCUCLK * millimeterPerStep/speed)
0xee0xff: device reset speed
0xee0xff = Word(65536 - MCUCLK * millimeterPerStep/speed)
0xgg0xhh(0..999): Laser power(for multifunctions-button-ON shot laser)
0xii(1..256): shot laser duration(for multifunctions-button-ON shot laser)
Example: AT2 0x0 0x1 0xE40x92 0xDF0xBB 0x10xF7 0xA 0x0……CRC8
Return: CH341 Pin6: low level 390ms

AT3..AT6: 3Party App ignore it

Incomplete instructions

For dynamic variable speed cutting

◆ Hardware Interface



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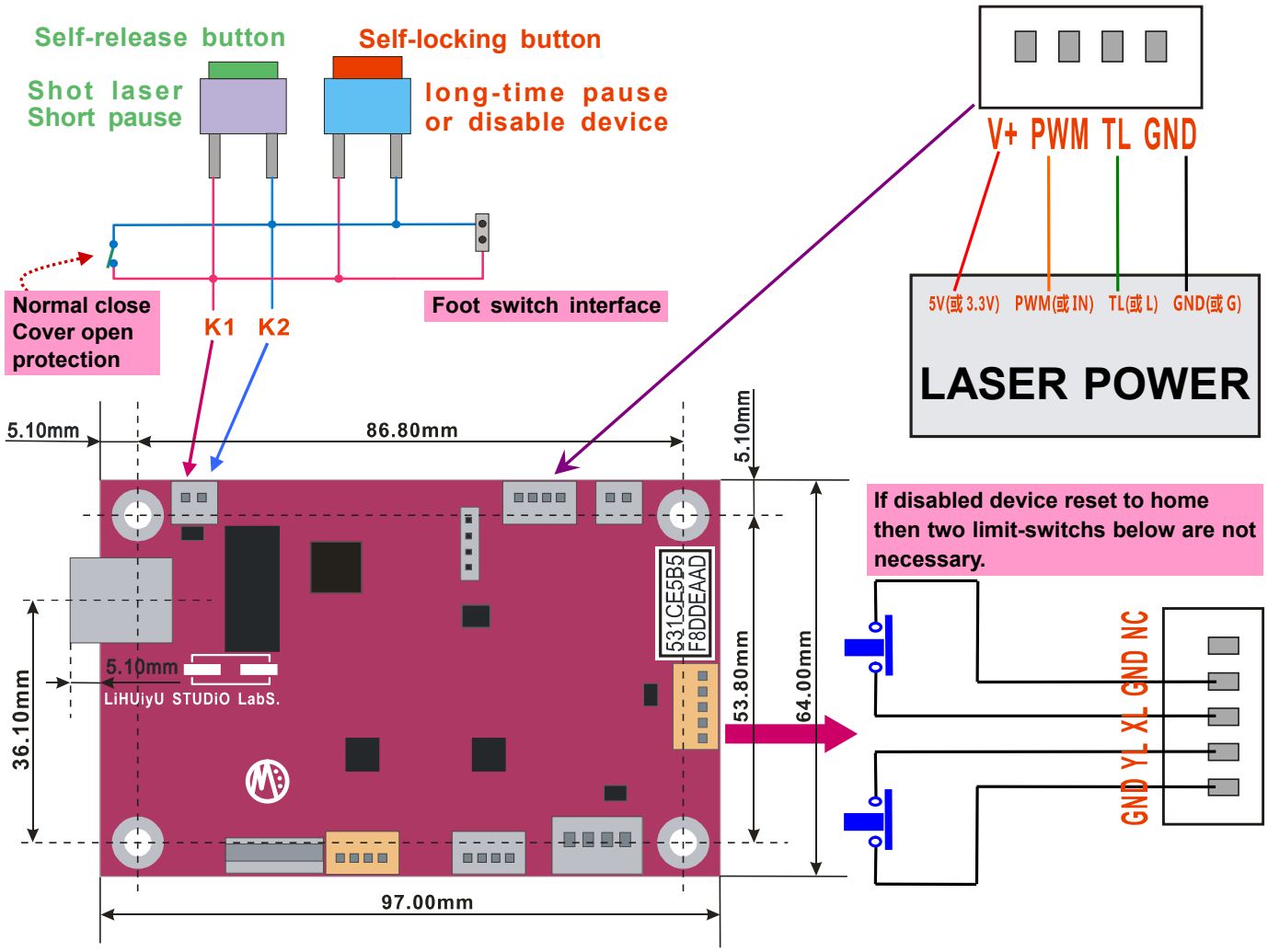
◆ Wiring diagram



I am very busy, I saw your software at last week. It is very good, perfectly controlling my PCB, perhaps this document can help you do better.

best regards

Lihuiyu

2024.06.24