



# **HY11S14**

## **Hardware User's Manual**

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## 1. IDE Frame

HY-IDE (HYCON-Integrated Development Environment) is composed by USB Control Board, ICE Board and Target Board that can emulate HY11P Series products' function and features. Through PC connection, HY-IDE can carry out emulation, debugging, program...etc. function. As illustrated in Figure 1.

The actual connection way of HY-IDE boards connected to HY-IDE software can be referred to Figure 1- 1.

The numbers of HY-IDE boards was listed as follows:

Board \ Model No.	DK02	DK03
Target Board	A09001-1	A11022-1
ICE Board	A09001-2	A11022-2
USB Control Board	A09001-3	A11022-3

The following statement can be referred when using development kit, HY11S14-DK02 and HY11S14-DK03. The difference between DK02 and DK03 will be specified particularly.

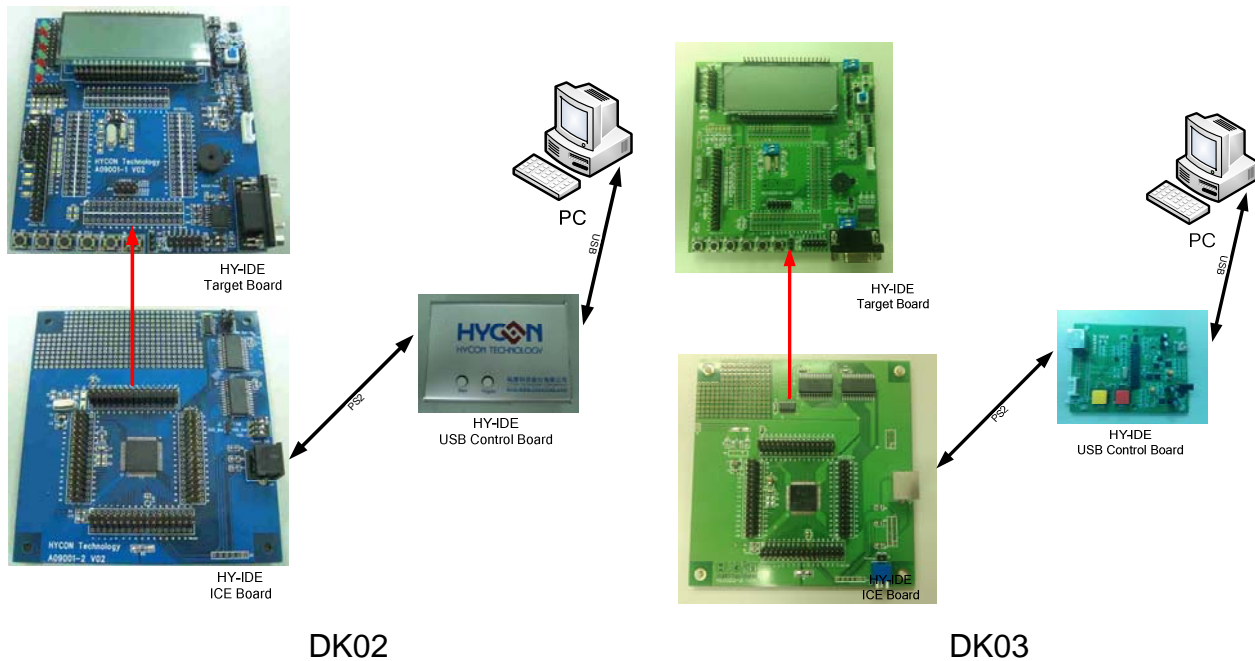
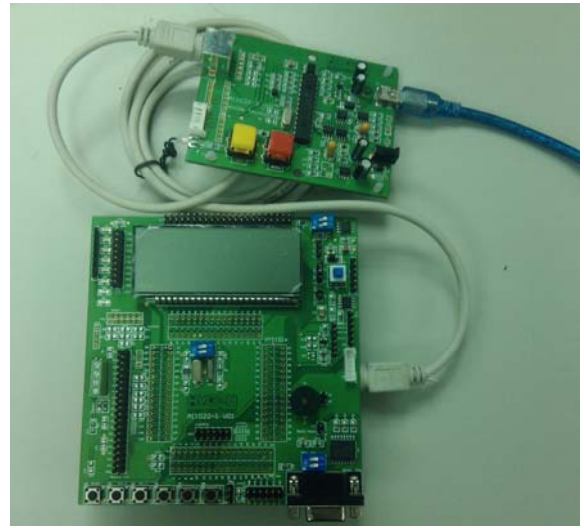


Figure 1



DK02



DK03

Figure 1- 1

## 2. HY-IDE USB Control Board

### 2.1. Diagram

HY-IDE USB control board is the bridge that connecting PC and HY-IDE ICE Board. Users can emulate HY11P Series products' function and implement programming OTP products in the engineering stage by the control board, as shown in Figure 2.

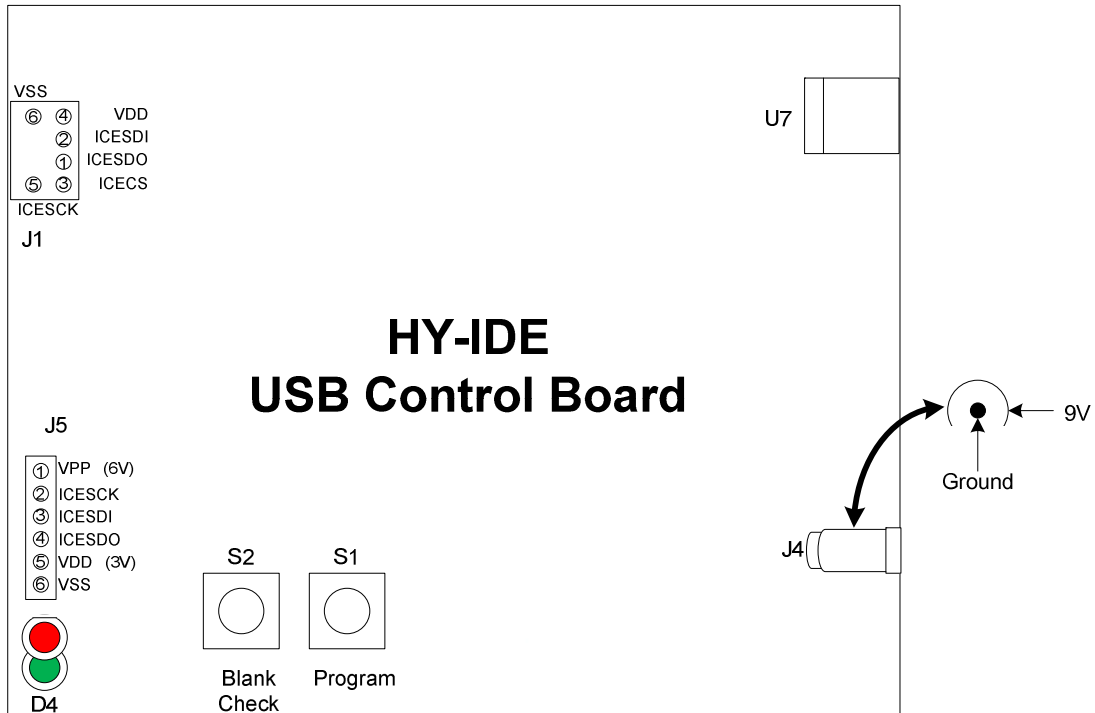


Figure 2

### 2.2. Circuit Description

Below is the description of Figure 2 connector :

◆ J4 : Adapter 9V Input

The internal is negative and the external is positive, providing programming power source (must be connected while OTP programming).

◆ U7 : USB Port and PC End Connector

Download program for emulation debug function

Download programming program for HY11P Series products

◆ J1 : HY-ICE Board Control Port

PIN 1 ICESDO connects ICE\_SDO of HY11S14

PIN 2 ICESDI connects ICE\_SDI of HY11S14

PIN 3 ICESCS connects ICE\_CS of HY11S14

PIN 4 VDD connects ICE\_VCC of HY11S14

PIN 5 ICESCK connects ICE\_SCK of HY11S14

PIN 6 VSS connects ICE\_VSS of HY11S14

◆ P6 : HY11P Series Programming Control Port

PIN 1 VPP(6V) connects VPP of the IC

PIN 2 ICECK connects PSCK of the IC

PIN 3 ICESDI connects PSDI of the IC

PIN 4 ICESDO connects PSDO of the IC

PIN 5 VDD(3V) connects VDD of the IC

PIN 6 VSS connects VSS of the IC

◆ S1 : Program, IC Programming Button

◆ S2 : Blank Check, IC Blank Check Button

◆ D4 : Two color LED;

Red LED : OTP programming, Blank Check.... execution error light

Green LED : OTP programming, Blank Check...execution success light

Green LED : USB or Adapter is powered on

### 3. HY-IDE ICE Board

#### 3.1. Diagram

HY-IDE ICE Board is the chip board of HY11S14. Its main function is to carry out emulation of HY11P Series Products. This ICE chip can directly emulate HY11P1X Series, HY11P2X Series, HY11P3X Series, HY11P4X Series and HY11P5X Series. The diagram of HY-IDE ICE Board of DK02 is shown as Figure 3 and HY-IDE ICE Board of DK03 is shown as Figure 4.

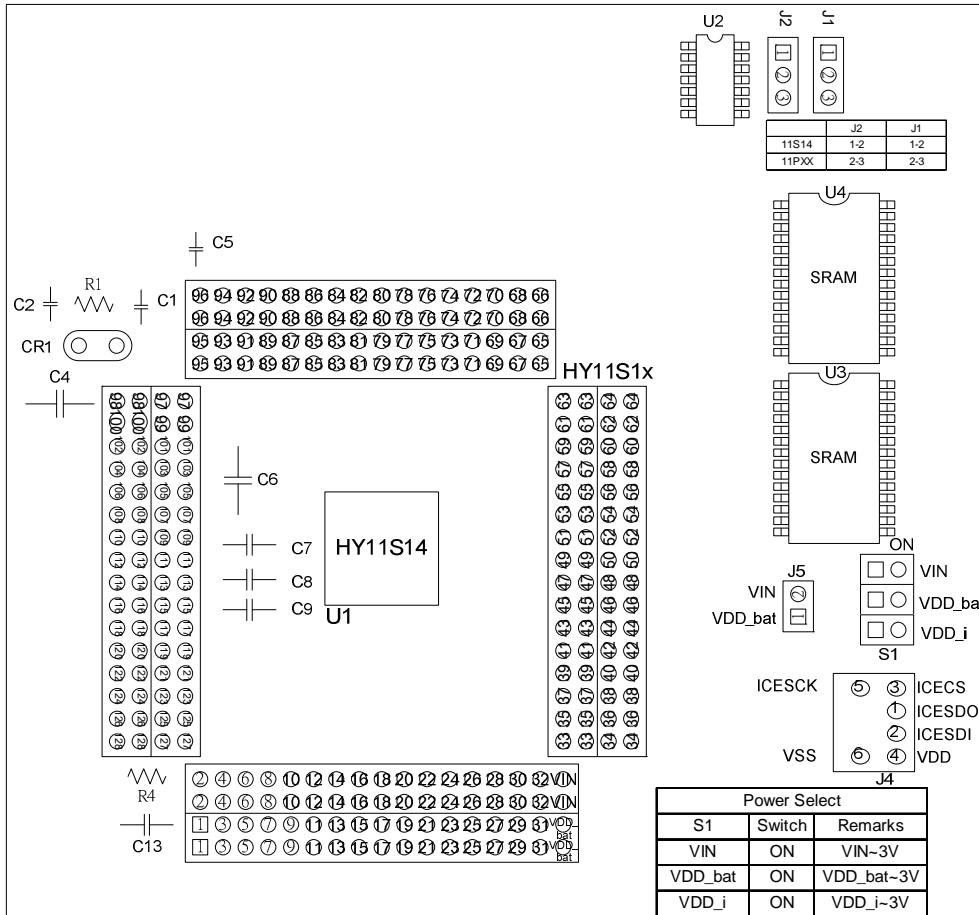


Figure 3





### 3.2. Circuit Description

Below is the description of Figure 3 connector :

- ◆ J4 : Connects the J1 PS2 communication port of HY-IDE USB Control Board. PC gives commands to HY11S14 through Control Board. It can download program to SRAM6 and can perform single execution, Free RUN...etc. debugging functions.
- ◆ S1 : ICE board power selection (voltage comes from the USB Control Board)  
VIN – when it switched to ON, it represents VIN~3V voltage.  
VDD\_bat – when it switched to ON, it represents VDD\_bat~3V voltage.  
VDD\_i – when it switched to ON, it represents VDD\_i~3V voltage.

- ◆ Setup Ways of Power Selection:

ICE Board power can be supplied by PC through USB or from external power sources;

When it is powered by USB, the switches of S1 VDD\_bat and VDD\_i , must be turned to ON.

When it is powered via external power source, it must be connected though HY-IDE Target Board V1 and the switch of VDD\_bat must be turned to ON.

- ◆ J5: Can set up whether to short VIN and VDD\_bat

- ◆ J6: For DK03, CR1 must be shorted,

- ◆ U3, U4: SRAM.

- ◆ J1, J2: Capacity selection of the emulation chip (For DK02)

The ROM Size of HY11S14 is 16k Word (32K Byte). So, when HY11S14 is chosen, J1 PIN 1-2 and J2 PIN 1-2 must be shorted.

When using HY11P Series products of which ROM Size is under 8K Word (16K Byte), J1 PIN 2-3 and J2 PIN 2-3 must be shorted.

- ◆ CR1, R1, C1 & C2: Connects external Crystal and other peripheral capacitors or resistors.
- ◆ C4: VDD power input regulated capacitor is recommended to keep in between 1uF to 10uF
- ◆ C5: VLCD power output regulated capacitor is recommended to keep in between 1uF to 4.7uF
- ◆ C6 and C7: Analog power regulated capacitor  
In order to enhance the operation performance of ADC, the regulated capacitor is suggested to locate as closer to the pin as possible.  
C6: VDDA capacitor 1uF ~ 10uF; C7: ACM capacitor 47nF ~ 100nF.
- ◆ C8 and C9 : ADC Input Filter Capacitor  
In order to enhance the operation performance of ADC, the filter capacitor is suggested to locate as closer to the pin as possible.  
C8 : ADC Input filter capacitor (AI0 – AI1) 0.1uF.
- ◆ C9 : ADC Reference filter capacitor (AI2 – AI3) 0.1uF.

- ◆ RST Circuit : Is demonstrated as in Figure 5.

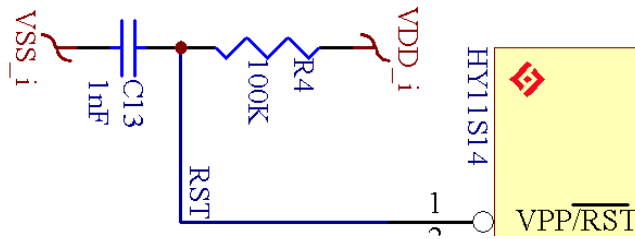


Figure 5

## 3.3. Circuit Diagram

The Circuit Diagram of DK02 can be referred to Figure 6, the Circuit Diagram of DK03 can be referred to Figure 7.

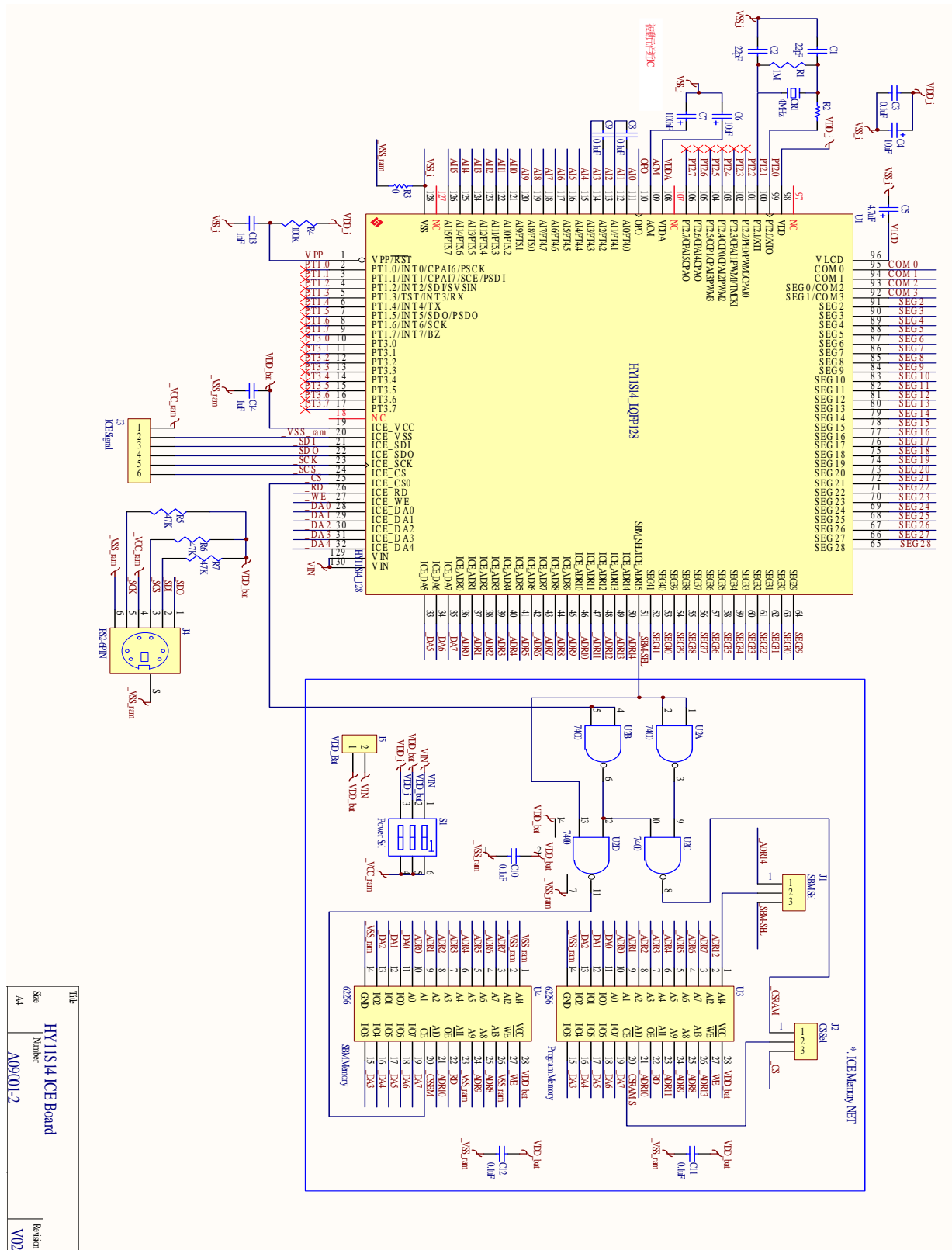


Figure 6

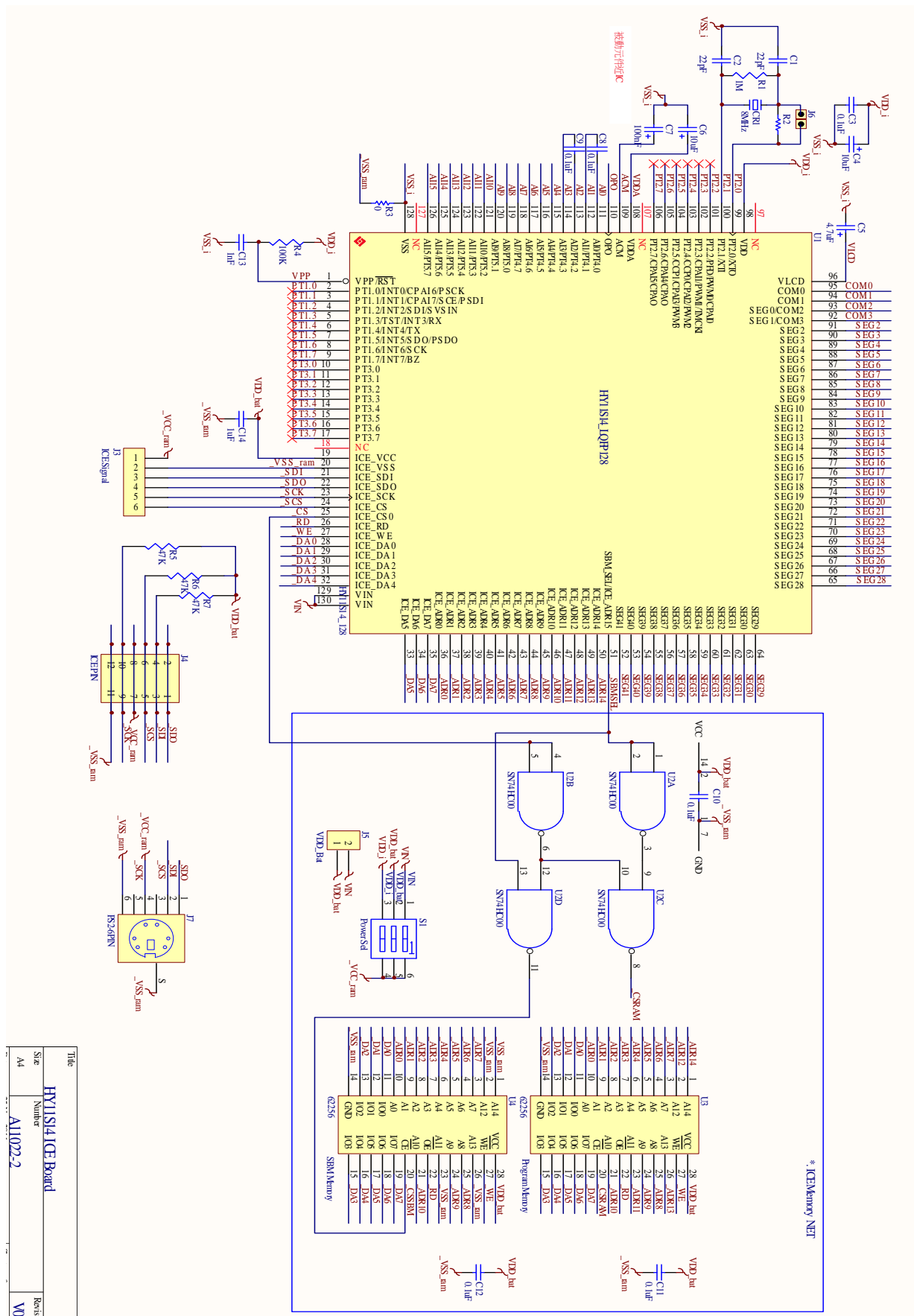


Figure 7



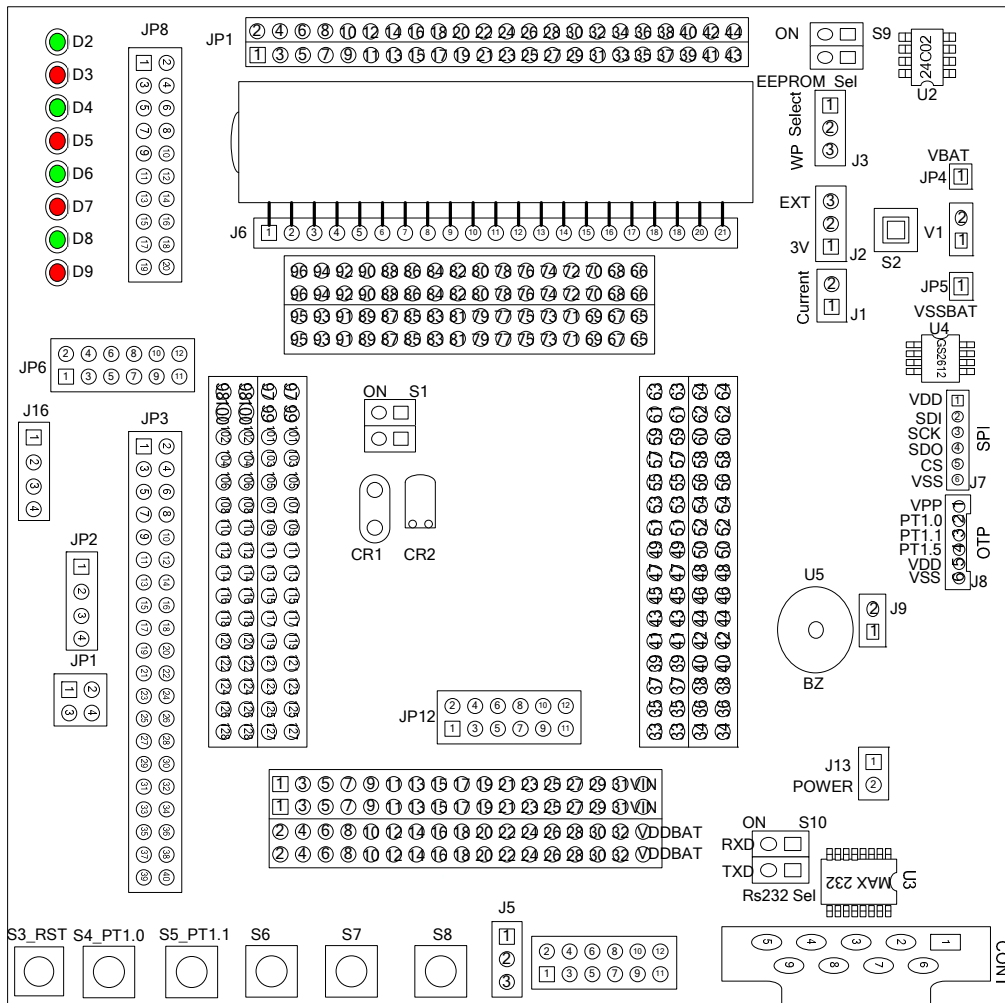


Figure 9

### 4.2. Circuit Description

#### ◆ Power System :

ICE power system can be powered by 3V regulated by HY-IDE USB Control Board or via external power input (external input power cannot exceed 3.6V that defined in HY11P series datasheets). When performing emulation on ICE, it can be powered by connecting U7 of HY-IDE USB Control Board via USB wire to PC end. USB power and external power is described as follows:

#### ■ USB Power:

When the system is powered by USB, the VDD\_bat and VDD\_i options of S1 switch of HY-IDE ICE Board must be turned to ON. Then it can be powered by the USB via regulated 3V of the Regulator.

When measuring IC current consumption, the option of VIN and VDD\_bat must be switched to ON, supplying 3V power from regulator via USB and the current consumption is measured by J1 of the Target Board.

#### ■ External Power:

When using external power, users must notice that the VIN, VDD\_i options of the HY-IDE ICE Board S1 switch must be switched to OFF status.

The external power can be inputted via VBAT positive end of JP4 of HY-IDE Target Board, the negative end is inputted by VSSBAT. S2 is the power on/off switch control.

#### ◆ J2: Power selection (choose whether the whole system power passes through Regulator (U4))

J2 PIN 1-2 short represents when VBAT external power input to U4, the voltage is regulated to 3V output, supplying VDD\_i for the whole system (the output voltage is changeable through modifying R8, R14 and R15.

The equation is:  $V_{OUT} = 1.240V \times (1 + \frac{R8 + R14}{R15})$  ).

J2 PIN 2-3 short represents VBAT power is directly inputted to VDD\_i.

**(Please note that the power should not exceed the specification of 3.6V)**

#### ◆ J1: can bridge current meter to test the whole VDD\_i current consumption. It must be short circuit when it is not connected to the current meter, as shown in Figure 10.



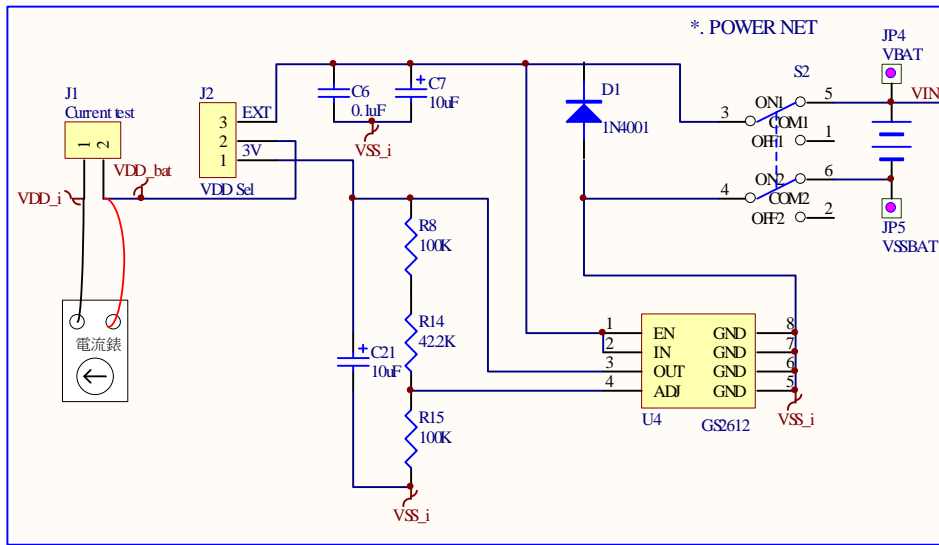


Figure 10

◆ J7 : SPI communication port, as shown in

Figure 11.

PIN1	VDD
PIN2	PT1.2(SDI)
PIN3	PT1.6(SCK)
PIN4	PT1.5(SDO)
PIN5	PT1.1(CS)
PIN6	VSS

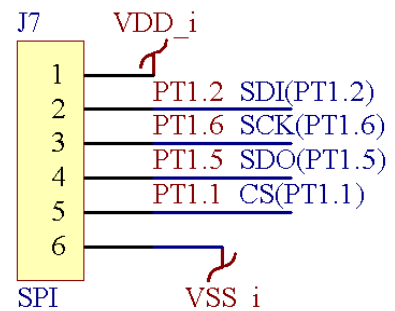


Figure 11

◆ J8 : OTP programming port

When product programming is implemented, HY-IDE ICE Board must be disconnected and the to be programmed chip must be connected. Through connecting J8 pin of HY-IDE Target Board to the J5 pin of HY-IDE USB Control Board, the programming function of HY-IDE Control Board can then program HY11P series chip, as shown in

Figure 12.

PIN 1	VPP (PIN 1)
PIN 2	PT1.0 (PIN 2)
PIN 3	PT1.1 (PIN 3)
PIN 4	PT1.5 (PIN 7)
PIN 5	VDD (PIN 98)
PIN 6	VSS (PIN 128)

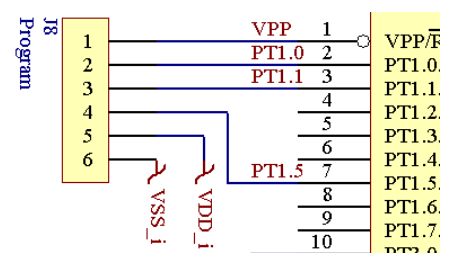


Figure 12

- ◆ CON1: UART communication port (RS232); in common use for 9-PIN connector, as illustrated in Figure 13.

J13: is the power input JUMP for U3 MAX232. If short, it is connected with J1 VDD\_bat power. MAX232 is a signal voltage conversion IC, it can convert I/O power signal to standard RS232 potential signal.

S10: is the connecting pin switch of RS232. RXD means connecting to PT1.3, TXD means connecting to PT1.4

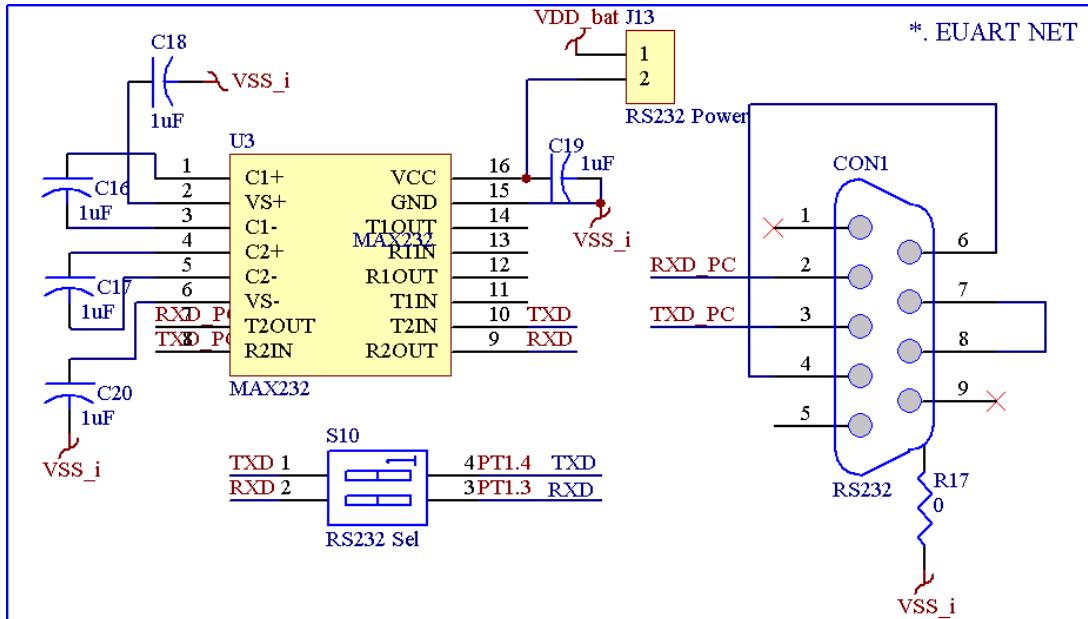


Figure 13

- ◆ J9: Buzzer JUMP that connects to PT1.7 signal, as shown in Figure 14.

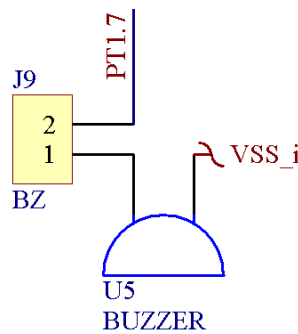


Figure 14

- ◆ U2: EEPROM 24C02, as shown in Figure 15.
- S9: When using EEPROM 24C02 to save the calibration parameters, PIN 1-2 of S9 must be started.
- J3: Short PIN 1-2 when it is prohibit writing 24C02.

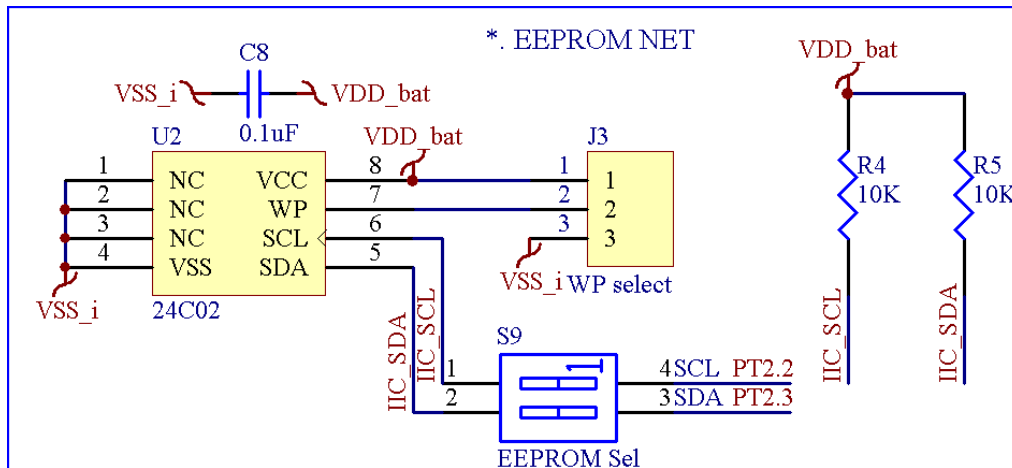


Figure 15

◆ J6, JP11: LCD pin, as shown in Figure 16.

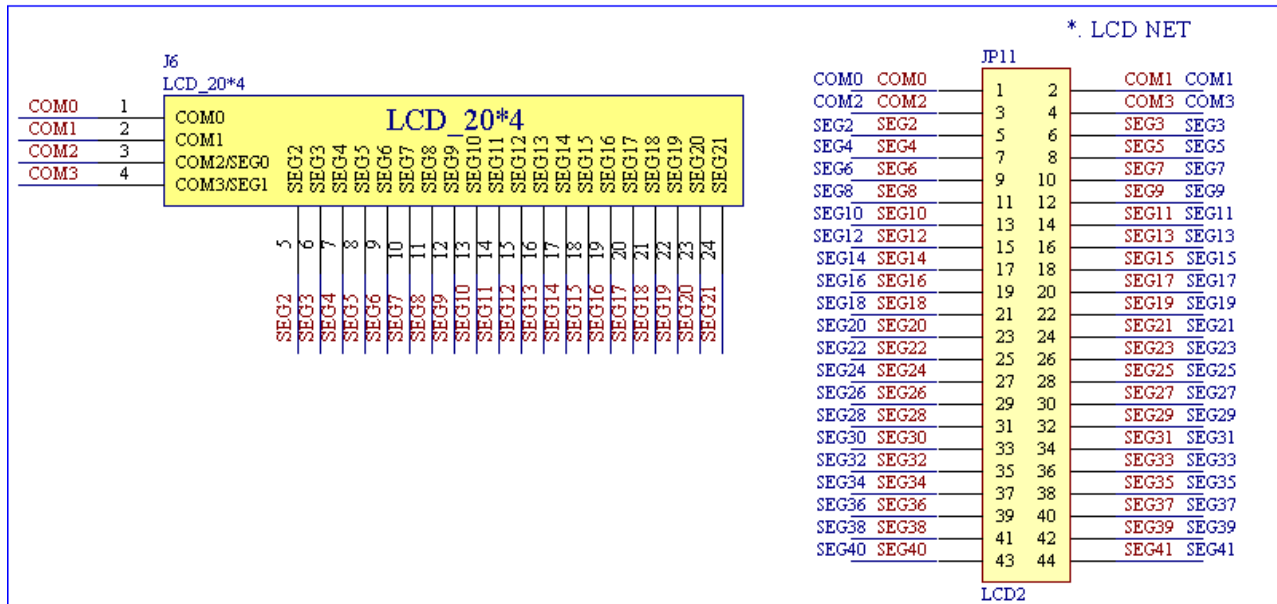


Figure 16

The LCD panel on HY-IDE Target Board is HYCON Technology's own mold specification, the panel symbol and pin definition is shown as Figure 17 and Figure 18. Detailed panel specification is:

- Operation Voltage : 3.0V
- Visible angle : 60
- Operation Frequency : 60Hz
- Bias : 1/3 bias
- Waveform : 1/4 duty
- Pin : 90 degree

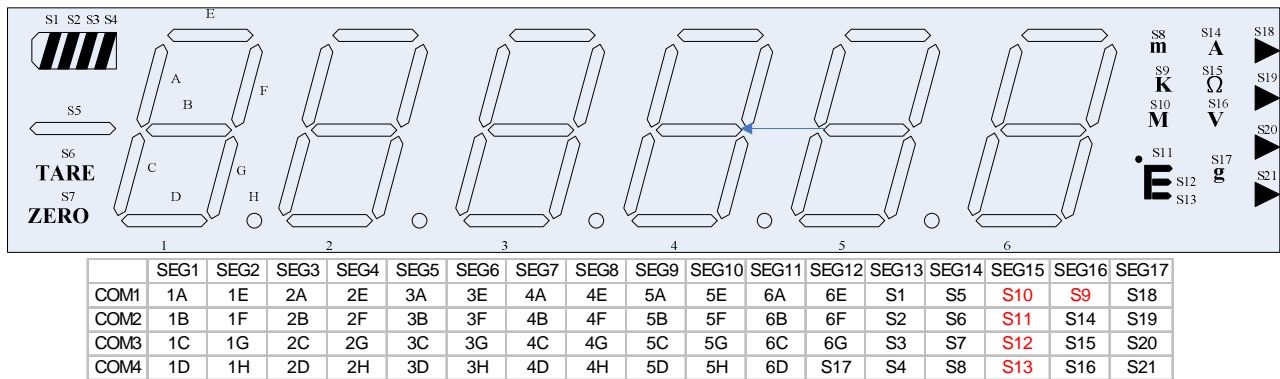


Figure 17

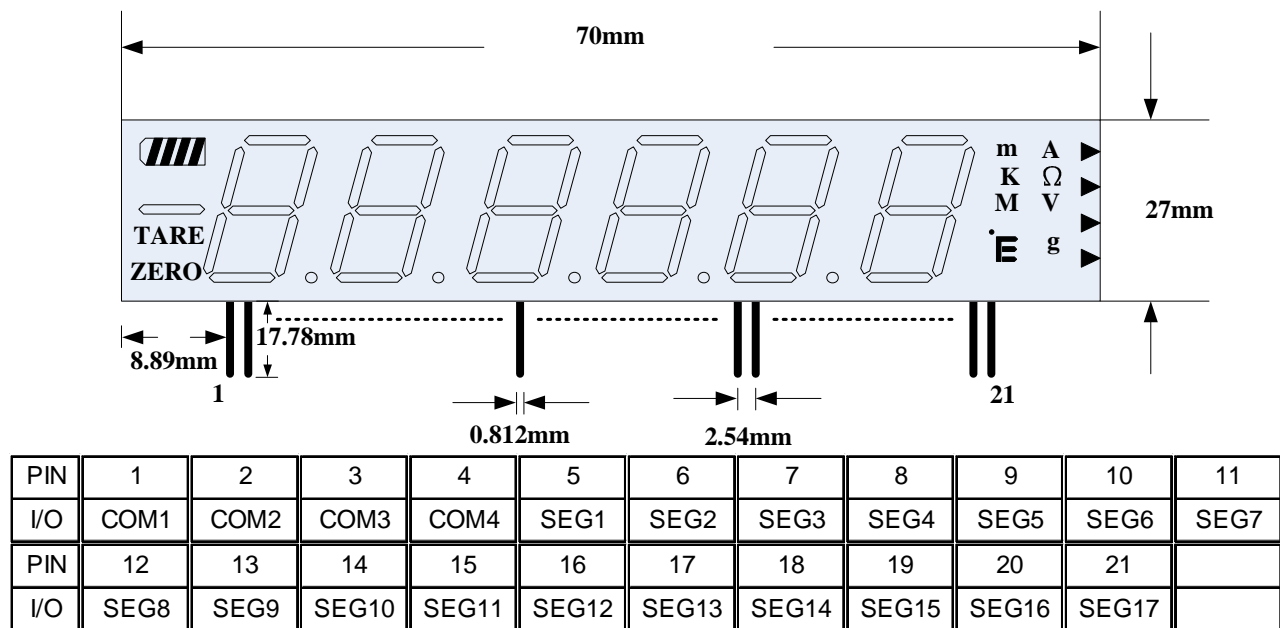


Figure 18

◆ CR1, R1, C1 and C2: Connecting external crystal oscillation circuit, as shown Figure 19.

HY-IDE Target Board is connected to CR1-4MHZ and CR2-32768Hz oscillator.

S1: Control PT2.0 pin and connect to CR1 or CR2 device; their switches cannot be started at the same time.

PIN1 ON, represents connecting to 4MHZ oscillation circuit

PIN2 ON, represents connecting to 32768HZ oscillation circuit

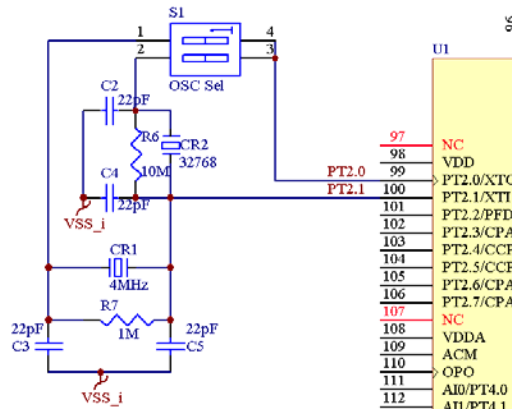


Figure 19

◆ JP9, JP12: PT1, PT3 Port of DK02 is shown as Figure 20. PT1, PT3 Port of DK03 is shown as Figure 21.

S4~S8: button, S3-RST, S4-PT1.0, S5-PT1.1

J5: is the expandable pin for S6, S7, and S8 button

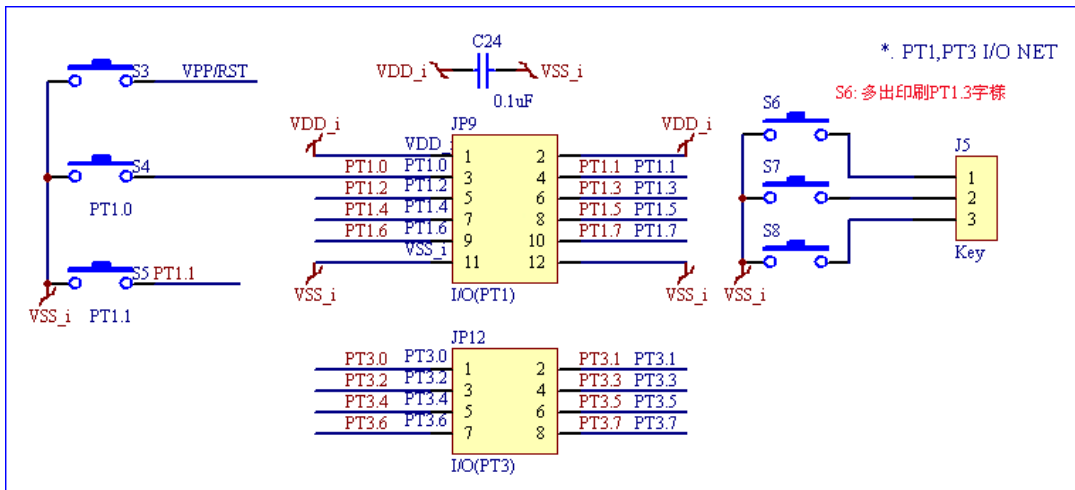


Figure 20

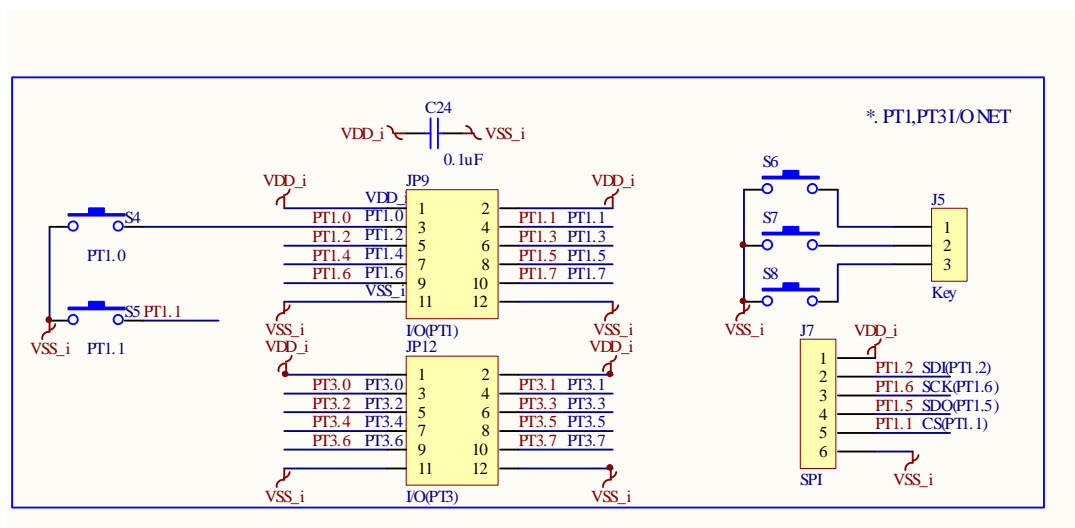


Figure 21

- ◆ JP8: PT2 Port is shown as Figure 22.  
 D2~D9: is the default pin for PT2.0~PT2.7 LED. Using different PT2 pin, JP8 must be shorted.

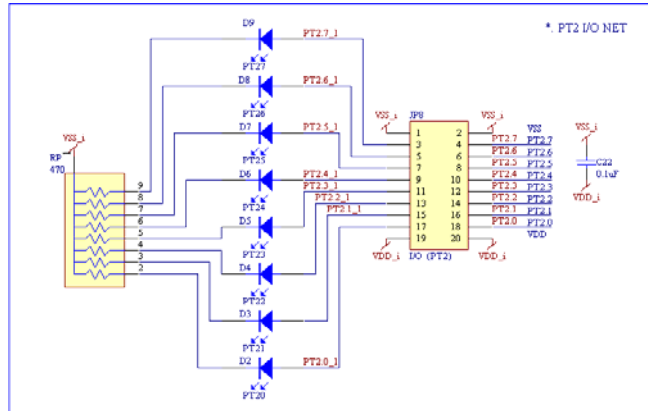


Figure 22

- ◆ D10: Is small package, SOT-23, Signal diode, as shown in Figure 23.  
 J10: Pump control signal  
 J12: Connecting JUMP of PT2.2 pin. PFD frequency output as PUMP voltage control.  
 J11: Pump voltage output

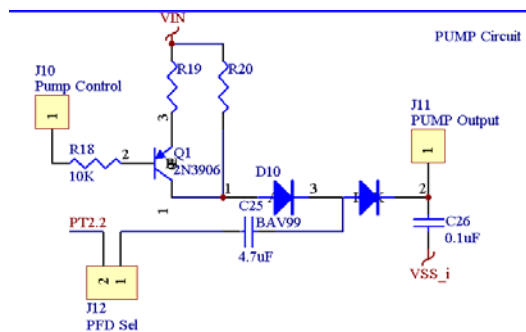


Figure 23

- ◆ Analog Port: For DK02, as shown in Figure 24. For DK03, as shown in Figure 25.  
 JP3: Analog port, providing external sensor input signal connection.  
 Other ports are all expandable analog signal input; they can be designed according to user's application.

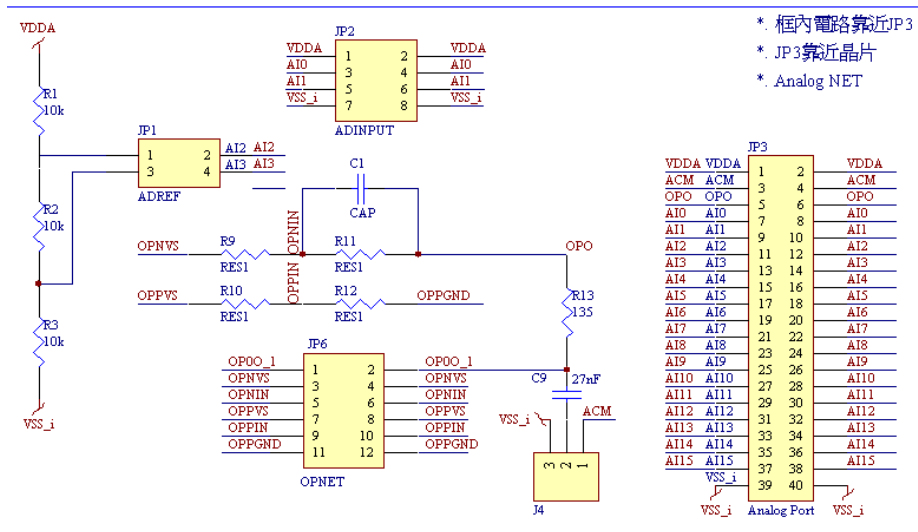


Figure 24

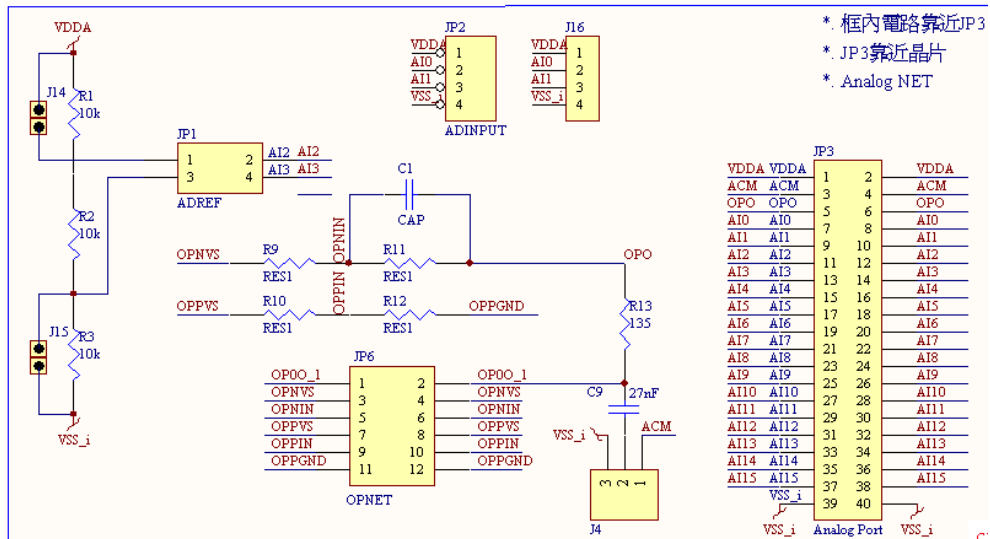


Figure 25

- ◆ C10~C15: Filter capacitor, shown as Figure 26
- ◆ . This filter capacitor provides ADC input signal source or it can filter voltage reference source

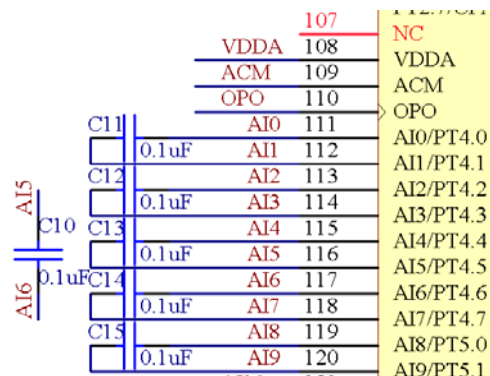


Figure 26

## 4.3. Circuit Diagram

The Circuit Diagram of DK02 can be referred to Figure 27, the Circuit Diagram of DK03 can be referred to Figure 28.

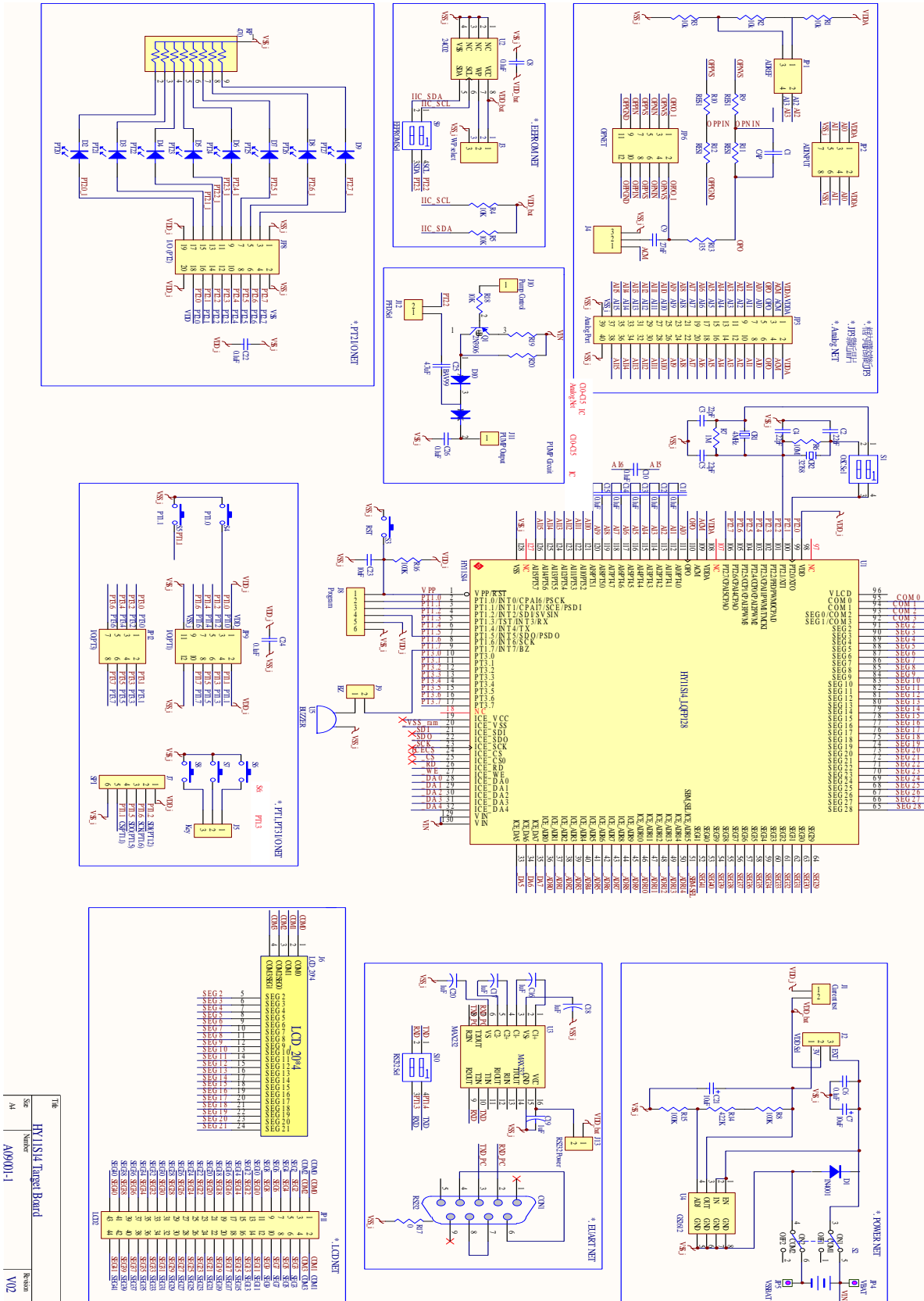


Figure 27





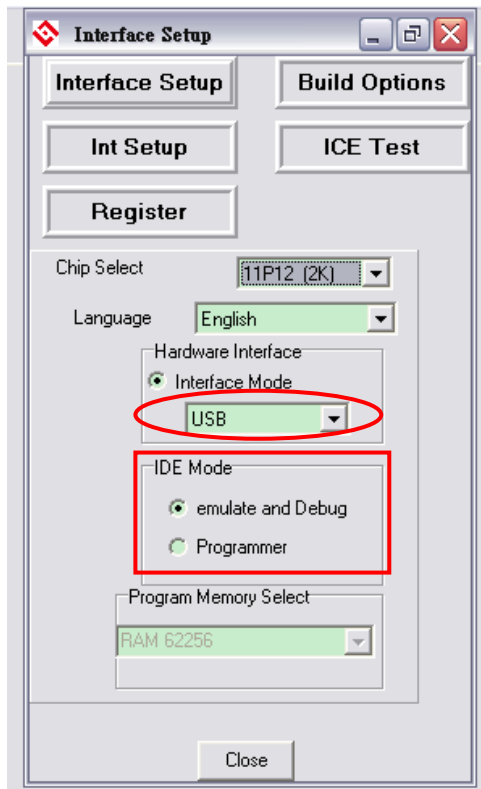
### 5. Simple Error Detection

#### 5.1. ICE cannot connect to software

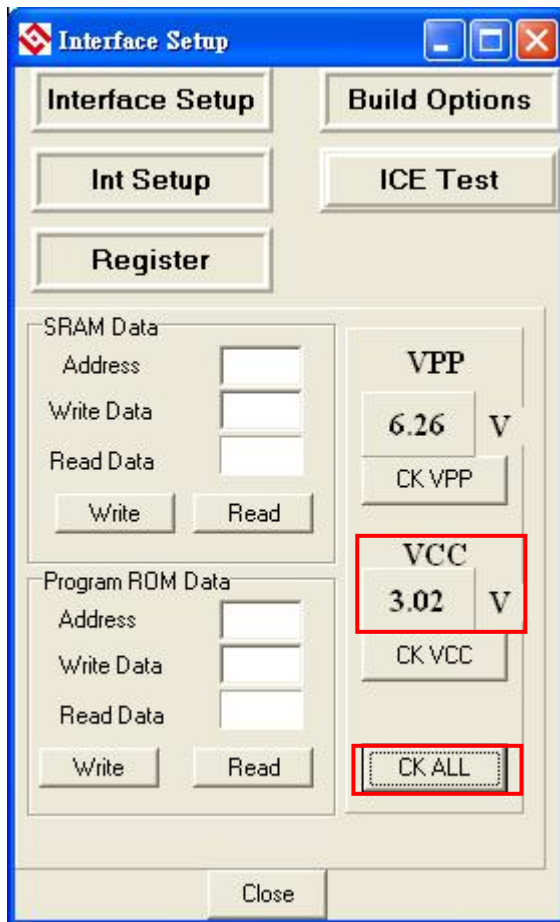
ICE not Connect    Checksum = 0x7D30

Simple error correction is described as follows when ICE cannot connect to software:

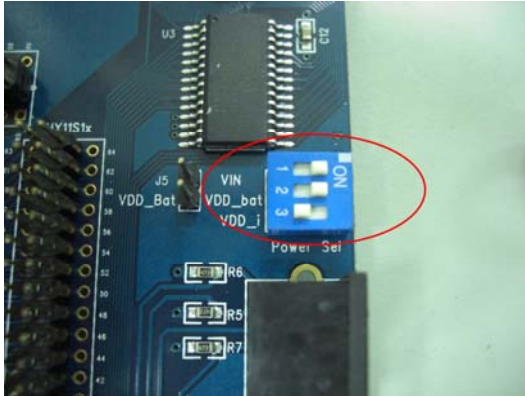
- Hardware configuration, IDE mode error detection:
  - Options =>Interface Setup =>Interface Mode defaults as USB
  - IDE Mode is emulate and Debug



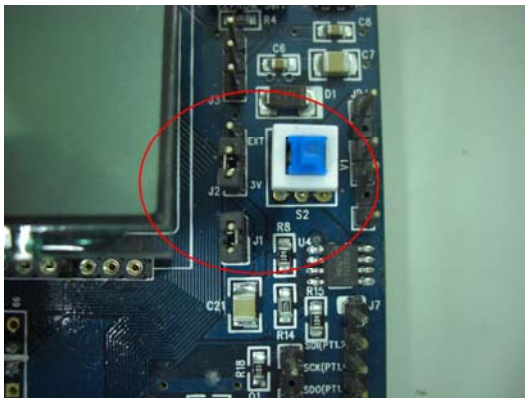
- Power System Debug :
  - This action is to testify whether HY-IDE USB Control Board is completely connected to PC through USB port and the regulated 3V voltage output functions normally.
  - Options =>ICE Test => Click CK ALL and confirm VCC voltage is close to 3V.
  - When Control Board only connects to USB port, the voltage of VPP closes to 5V; when Adapter 9V of J4 is connected, VPP voltage will close to 6.3V.



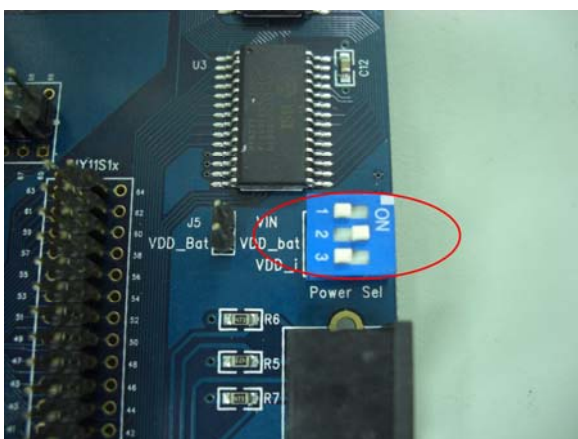
- ICE Power Debug:
  - When using USB to supply power, a few switches must be inspected to ensure ICE chip operates normally.
    - ◆ ICE Board S1, switching VIN, VDD\_bat to ON



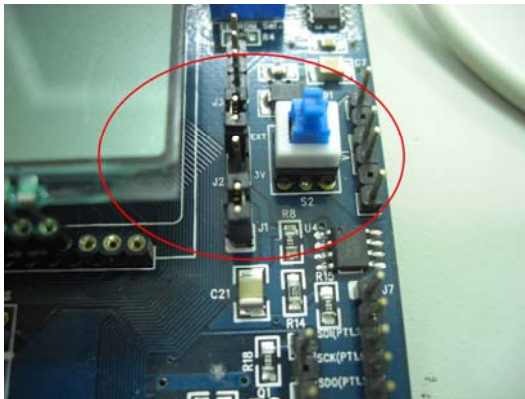
- ◆ Target Board. Short J2 PIN1-2 and J1, switching S2 to ON



- ◆ Use DMM to inspect whether 3V voltage exists in VDD(PIN98)-VSS(PIN128) and ICE\_VCC(PIN19)-VSS(PIN128);
- ◆ If voltage is absent, please refer to procedures of "[Power System Debug](#)" and "[ICE Power Debug](#)" chapter;
- Using external power supply, inspects some switches:
  - ◆ ICE Board S1, switching VDD\_bat to ON, other switches turns OFF

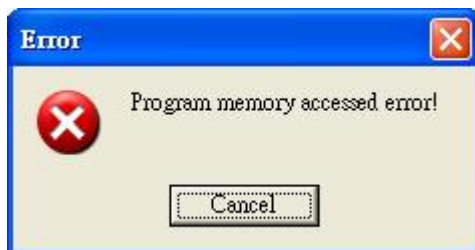


- ◆ Target Board JP4 is inputted from external voltage, making J1 short, PIN1-2 of J2 short, (if > 3V is needed, short PIN2-3 of J2), S2 ON

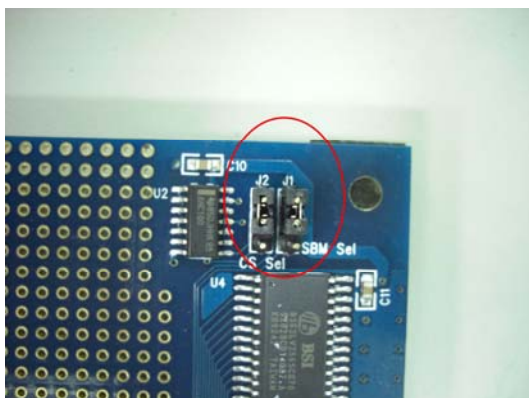


- ◆ Using voltmeter to inspect, whether 3V voltage exists in VDD(PIN98)-VSS(PIN128) and ICE\_VCC(PIN19)-VSS(PIN128);
- ◆ If voltage is absent, please refer to procedures of "[Power System Debug](#)" and "[ICE Power Debug](#)" chapter;

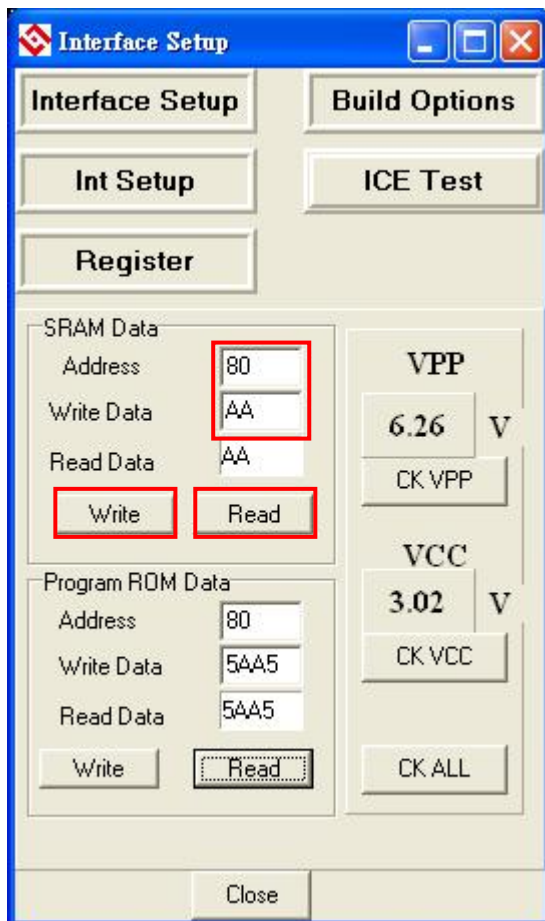
### 5.2. Program Memory Loading Fail



- ICE SRAM Debug:
  - Check whether ICE Board J1 & J2 is correct; when emulating HY11S14 (16K), J1 PIN1-2 and J2 PIN1-2 must be short circuit.



- SRAM Data, Program ROM Data Debug:
  - Options =>ICE Test =>SRAM Data
    - ◆ Key in 80 in Address and AA in Write Data respectively. Click Write button, data will be written in SRAM;
    - ◆ Click Read button, readout data; the filled in data will display in Read Data location.
  - Options =>ICE Test => Program ROM Data
    - ◆ Key in 80 in Address and 5AA5 in Write Data respectively. Click Write button, data will be written in ROM;
    - ◆ Click Read button, readout data; the filled in data will display in Read Data location.



## 6. Revision History

Major differences are stated thereafter:

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<b>Version</b>	<b>Page</b>	<b>Revision Summary</b>
V01	ALL	First edition
V02	26~30	Add Chapter 5 Simple Error Detection
V04	ALL	Add the description related to DK03
	28	Correct the description of ICE power debug