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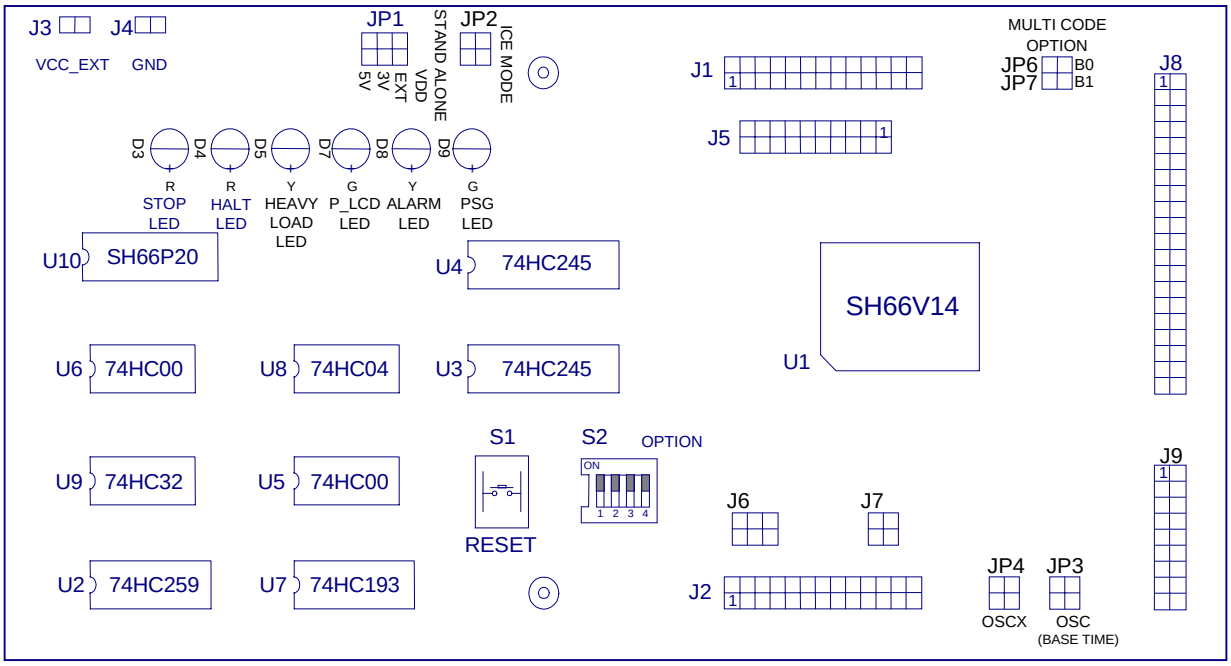
SINO WEALTH

SH6614 EVB

Application Notice for SH6614 EVB

SH6614 EVB

The SH6614 EVB is used to evaluate the SH6614 chip's function for the development of application program. It contains of a SH66V14 chip to evaluate the functions of SH6614 including the PSG and the LCD waveform. The following diagram shows the placement of SH6614 EVB.



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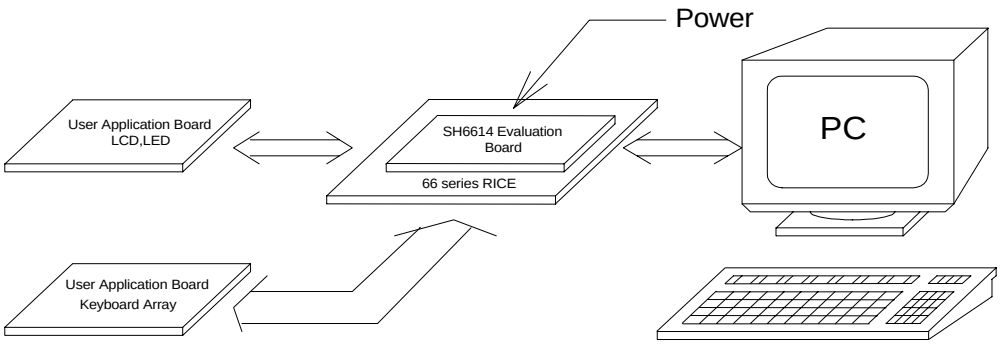
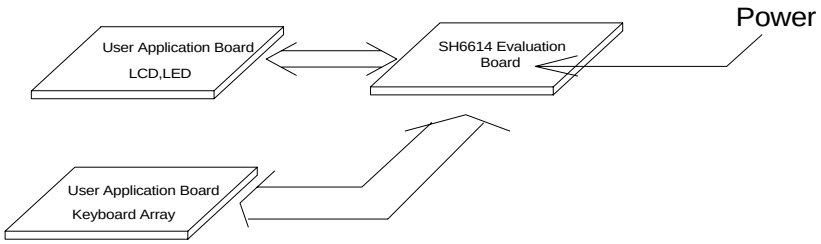
There are two configurations of SH6614 EVB in application development: ICE mode and stand-alone mode.In the ICE mode, the SH66xx ICE (motherboard) is connected to the SH6614 EVB by the ICE interface.



(a) ICE mode

In the standalone mode, the SH6614 EVB is no longer connected to the motherboard. But the EPROM board has must be connected to the SH6614 EVB by the EPROM interface. The EPROMs which may be the 27512 or 27256 store the application program.



(b) Stand-alone mode

The process of your program's evaluation on SH6614 EVB

Uasm66.exe: assemble the program, and get binary (*.obj) file and the other files.
Depart the one 16 bits obj file to the two 8 bit files by convert.exe.

Usage example (for example: aaa.asm):

1.Run the SH66 series assemble program:
C: >uasm66 aaa.asm ; to produce the obj file: aaa.obj
2. Depart the aaa.obj to two 8 bits files aaah.obj and aaal.obj, for example:
C: > convert
Input the 16 bits (.obj) file aaa.obj
Then aaah.obj and aaal.obj will be created.
3. Write the aaah.obj to EPROM (ROMH)
Write the aaal.obj to EPROM (ROML)
4. Put the two EPROMs (ROML and ROMH) on the EPROM board.
5. Then put the EPROM board on the EVB by J5, J6 and J7.

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SH6614 EVB Programming Notices

1. Never turn the switch “WRMSKP” on.
2. Clear data RAM and initialize all system registers at the beginning.
3. Do not perform logical operation with I/O ports. Especially when the I/O ports have external connections.
4. Do not perform arithmetic operation with those registers only have 1, 2 or 3 bits. This kind of operation may not get the result you expected.
5. Never use reserved registers.
6. If “IE” instruction (interrupt enable) is set outside the interrupt processing program and there is “HALT” or “STOP” instruction, this two instructions should be followed “IE” instruction closely.
7. After CPU responding to an interrupt, IRQ should be cleared before resetting IE in order to avoid many responses to one interrupt.
8. Interrupt Enable instruction will be automatically cleared after entering interrupt-processing program. If setting IE too early, there is a possibility of re-entry the interrupt. So the Interrupt Enable instruction should be placed at the end and followed closely by two instructions include “RTNI”.
9. During the two successive instruction cycles next to Interrupt Enable instruction, CPU will not respond to any interrupts.
10. After CPU responding to interrupts, each bit of IE will be cleared by hardware while IRQ should be cleared by software.
11. It is necessary to add NOP before or after the HALT instruction, else the CPU will execute error instruction when it wake up from the HALT.

```
.
. .
NOP
HALT
NOP
.
. .
```

12. It is wise to set Interrupt Enable flag before you return from subroutine in two instruction.

```
.
. .
LDI     IE, 04H;      Enable timer0 interrupt
LDA     Temp,0
RTNI
```

13. When you set Interrupt enable flag as the following and your subroutine do not set Interrupt Enable flag, then your system will never wake up if an interrupt entered between the NOPs.

```
.
. .
LDI     IE, 1111B;  IE = Interrupt enable flag
NOP
NOP
NOP
HALT
.
. .
```

14. To add “p=66xx” and “romsize=xxxx” at the beginning of a program. If any problem is found in compiling the program, check if the SH6566.dev is located at the program directory.
15. When the programmer uses the PSG function, it’s important to confirm the rules listed below:
    (a) After PSG finishes playing sound, please reset CH1EN/CH2EN to “0”, otherwise it may generate a 32KHz switch signal in PA.1 & PA.2 pin, its frequency is out of the hearing range and consume much more power than normal operation. This situation can be monitor by the green LED D9. If it emit light, it means the PA.1 & PA.2 has sound output or toggling or at a high stage, thus consumes power. So it is better to enable only one PSG channel when we use PSG function to produce one tone. **Don’t enable two PSG channels together to produce one tone**, otherwise it will produce some unpredicted errors. For example, the volume sometime will become louder and sometimes will become smaller. (It’s caused by the reason of synchronized phases for the two channels.)
    (b) It’s may be louder if we get the same tones by using two PSG channels, but it will produce some unpredicted errors listed in (a). **You can get the louder tones by tuning the volume register**.
    (c) If it is necessary to use 2 channels together (Ex. To play two channel melody), don’t let the score always be the same tones as we can do, then the unpredicted errors will not occur or it will be ignore through user hearing.
    (d) In ICE mode, there may be some errors when the 455Hz ceramic is used as PSG source clock. To avoid this problem, users should remove the 455Hz ceramic on EV Board, and connect the ICE clock to the input pin of 455Hz ceramic.

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16. SH6614 provides low frequency and high-frequency clock for the system to use as Main Clock, and it should be used in Stand Alone mode. In ICE mode, because the ICE system can't switch Main Clock, it is recommended to adjust the internal clock to debug programs.
17. When switching from low frequency to high frequency, start High Frequency first and delay for over 5ms, then switch to high frequency as Main Clock. When switching from high frequency to low frequency, add three NOP instructions.
18. Multiplexing usage of SH6614 LCD and Key Scan:
    If there is no surplus of SEGMENT, it is necessary to use audion to separate the LCD displaying and key scan. If there are more SEGMENTs, which can be directly used as scanning output line, then each SEGMENT must have pull-up resistors. The value of the resistors should not be too small, and it should be about 2M.
    (a). To reduce the effect to the maximum extent that SEGMENT as I/O port be on LCD displaying, data stored in the corresponding memory of scanning port should be pre-processed first, then SEGMENT is switched to the I/O state and the state of input port is immediately read before the state of SEGMENT is switched back again. Last the data of keyboard is processed in the keyboard-scanning program. This will shorten the time of Segment in the I/O state, and minimize the effect on LCD. (Duty ratio of key scanning in the whole period of LCD displaying should be reduced as possible as we can).
    (b). If two or more keys are pressed down simultaneously, two or more short-circuits of Segment will appear. And if electrical levels of the Segments are not equal, conflicts among them will appear and will have great effect on LCD displaying. If they are equal, this problem can be avoided. So, the program should set the Segments displaying RAM to 0 or 1 simultaneously in order to equal the electrical level when the Segments used as keyboard scanning lines.
    (c). When SEGMENT signal is switched from LCD SEGMENT state to I/O state, the value of corresponding memory $350-$36D (the corresponding memory units of SEGMENT when it is in I/O state) is shown on LCD. If the value is 0, the corresponding place of LCD is lightened and if the value is 1, it isn't. Thus, at the beginning of the program, the value of memory $350-$36D should be set to 1, this can reduce LCD flicker when entering the keyboard scanning program.
19. When setting Timer Counter, first fill TOL, then TOH.
20. After setting TM0, TOL, TOH, it is unnecessary to reset them after interrupt each time. If TM0, TOL, TOH are reset after each TIMER interrupt, interrupt interval time will not equal because the interrupt timing is not successive.
21. Any instruction containing writing to or reading form memory, it should not be used to operate with I/O Port. It is best to avoid using those instructions such as "SUB, ADD " which do not contain Write operation with I/O Port but have computation operation.
22. "1" must be written to I/O Port before Reading.
23. Writing "1" to I/O Open Drain and then entering "STOP" will cause current leakage ranging from tens to hundreds micro-ampere. So pull up or pull down resistors value from 1 to 2 MΩ must be used to prevent I/O Float when I/O in Open Drain mode.
24. Directly reading PORT states ensure the count is correct.
25. Interrupt activating from STOP at the first time can save power.
26. When the Compiler of old version compiles program, the last line will be read twice. So, if the last line is an instruction, two same operations will be occurred. If there is Label in the last line, compiler will give an error named 'repeated definition' . This will happen in main program or included files and it is recommended that the last line should be a blank line or END.
27. The stack has four layers, if an interrupt is enabled, there only have three layers can be used. Otherwise, if an interrupt comes, the stack will be overflowed that will cause CPU Reset or other errors.
28. Key De-bounce time is recommended to be 50ms. If a user use Rubber Key, it is best to test Rubber Key's De-bounce time.
29. Index register DPH and DPM both have three bits only, so pay attention to the referred address when using them.
30. It takes 0.3 second to wake up from STOP when using 32768Hz crystal. So, if the system is waked up by key pressing, the key may have been released when the program begins to read Key value. Please pay more attention to this problem.
31. Before the program enters "STOP" instruction, LCD should be turned off previously.
32. The "NOP" instruction should be added at the beginning of the program to ensure the IC is stability.

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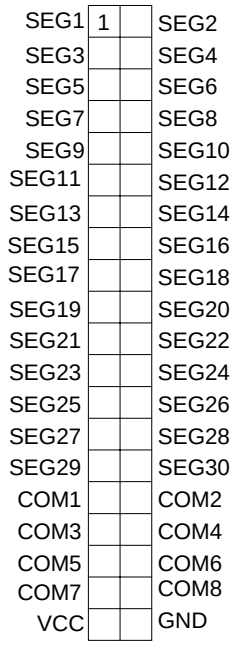
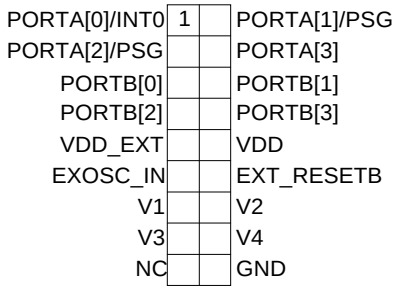
LCD interface connector: J8 (Top View from EVB)



Keyboard interface connector: J9(Top View from EVB)



External Vcc input: J3, J4 (The external power input when the EV. Board worked in stand alone mode. The voltage of Vcc_Ext must be 5V±5%)

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Jumper setting:

JP1 (EVB power select):

- Short the 5V positions, the voltage (5V) of SH66V14 is internal source.
- Short the 3V positions, the voltage (3V) of SH66V14 is internal source.
- Short the EXT positions, the external power (2.4~6.0V, refer to SH6614 spec) of SH66V14 is input from VDD_EXT(J9/9).

JP2 (SH6614 EVB ICE/Stand-alone mode select):

- If you short the "With ICE" positions, the clock of SH6614 EVB is fed from the ICE.
- If you short the "Stand alone" positions, it is only for stand-alone mode. The system clock is selected by JP3 and JP4.

JP3 (SH66V14 OSC select):

- If short the left positions, and turn off "S2" bit1 to select 262KHz RC on board for base time.
- If short the right positions, and turn off "S2" bit1 to select XTAL 32.768KHz on board for base time.

JP4 (SH66V14 OSCX select):

- If only short the left positions, the OSCX of SH66V14 chip is RC 1.8MHz.
- If only short the right positions, the OSCX of SH66V14 chip is Ceramic 455KHz.

JP6, JP7 (SH66V14 multi-code select):

- JP6 (B0) has been pulled high; JP7 (B1) has been pulled low. So,
  The Default State is code01;
  If you short the JP6, then the code00 is selected;
  If you short the JP7, then the code03 is selected;
  If you short the JP6 and J P7, then the code02 is selected.
  When the programmer has noticed the system register $0AH, the above functions will have been reality.

Switch setting:

S1 (Reset):

Reset the whole system when push the button.

S2 (Option):

1. If turn on bit 1 (RC262K/XTAL32K) of this switch, you can choose XTAL32.768KHz of OSC; if turn off bit 1 of this switch, you can choose RC262KHz of OSC.
2. If you turn on bit 2 (LCD/LED) of this switch, then the chip is set to LED output; else is set to LCD output.
3. If you turn on bit 3 (WARM-UP SKIP) of this switch then skip the warm-up function; else disable it.
4. If you turn on bit 4 (STACK ON/OFF) of this switch, then enable the stack function in ICE mode; else disable it.

LED declare:

HALT indicate:

D4 is lighted when the system has gone into the HALT or STOP.

Heavy load indicate:

D5 is lighted when the system has been in the heavy load mode.

LCD output form indicate:

D7 is lighted when LCD on.

Alarm indicate:

D8 is lighted when alarm is working.

PSG indicate:

D9 is lighted when PSG is working.

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Notice:

Evaluate your program with ICE indicate:

1. After enter to RICE66 and successfully download the user program, push the F5 (Reset) on PC keyboard before run your program when you evaluate your program with ICE. If there were abnormal response, the user should power off the ICE, quit RICE66 and wait for a few seconds before restart.
2. First time run RICE66, need to select an appropriate MCU type, clock frequency ... save the settings and restart RICE66 again.
3. Can't Step (F8) or Over (F9) a HALT and STOP instruction.
4. When you want to escape from HALT or STOP (in ICE mode), you should press the F5 key on PC keyboard twice.
5. The maximum current limit of the 3V power is 100mA, when the user uses internal 3V power to drive external device such as LED.
6. When EV. Board worked in "with ICE" mode, you can input the clock from EXOSC_IN (J9/11) as the system clock. (refer to the RICE66 User's Guide)