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April 1st, 2010
Renesas Electronics Corporation

Issued by: Renesas Electronics Corporation (<http://www.renesas.com>)

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H8S/2117

Keyboard Controller Sample Code

Introduction

This sample code demonstrates H8S/2117 evaluation board to show I2C, UART, KBU and Timer functions.

Users can choose items to test, I2C or KBU protocol, from the display menu through UART.

Target Device

The example application is applied to the following configuration:

H8S/2117

The H8S/2117, part name R4F2117VTE, is a group of the H8S family, H8S/2100 series based on the H8S/2600 CPU Core used in the application system with a maximum operating frequency at 20MHz.

ROM: 160K bytes

RAM: 8K bytes

ROM Type: Flash Memory

I2C: 2ch with open-drain

PS/2: 3ch

PWM: On-chip 14-bit PWM timer 2ch, 8-bit PWM timer 12ch

Package Type: PTQP0144LC-A (TFP-144V)

Contents

1. Software Structure.....	2
2. Keyboard Controller (KBC)	3
3. Common KBC Board.....	4
4. Keyboard Buffer Control Unit (PS/2) APIs	4
5. I2C Bus Interface (IIC) APIs.....	5
6. UART Display on Hyper Terminal Setup	6
7. Program Flowchart.....	7

1. Software Structure

H8S/2117 EVB is used as a main processor which incorporates H8S/2117 operating at a maximum frequency of 20MHz.

The basic functions of the H8S/2117 EVB, Part Name YTD08EV211701, are as following.

Input Clock Main: 20MHz

16 x 8 matrix keyboard

3 PS/2 interfaces

2 SMBus channels

TPM connector

Sideband connector for Intel platform(un-mounted)

SIM card socket and Smart card socket(un-mounted)

CIR(un-mounted)

On board programming in boot mode

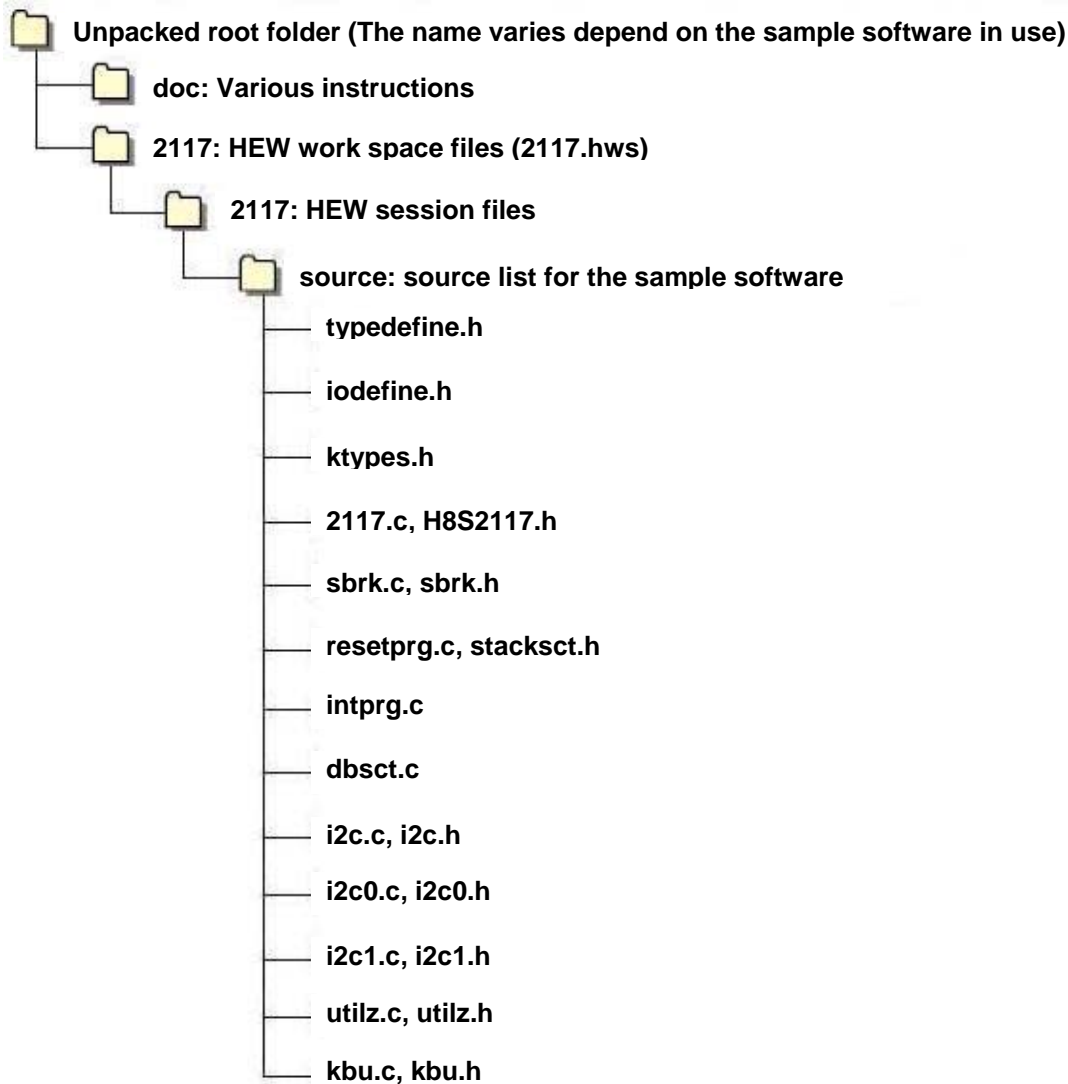
E10A programming and debugging support

C Compiler

High Performance Embedded Workshop HEW 4.04 by Renesas Technology Corp.
H8S, H8/300 standard tool chain V.6.02.01 by Renesas Technology Corp.

Structure of the sample code software folder

This sample code software consists of the following folders and files:



2. Keyboard Controller (KBC)

Keyboard controller is a quite important device in the notebook personal computer. Normally, It is in charges of the keypad scanning, key code encoding, PS/2 keyboard / mouse data receiving, and data / command intercommunication with the system bios. Such functions are very basic but quite important as a human interface device.

In the notebook computer field, keyboard controller can be more powerful to add-in advanced power management functions and user defined functions as we normally design by using microcontroller. Keyboard controller can accept varied data entry by human input device keypad or external keyboard / mouse. That means keyboard controller also is in the good position to control the system resource and power dissipation. It is possible to add-in power management function, such like SMBus monitoring, smart battery status monitoring, smart selector and smart battery charger handling by just a keyboard controller device. Others functions are also possible implement since it is a Embedded Controller

3. Common KBC Board

In order to accept all of Renesas KBC solution, this common KBC board is to design in most common KBC functions and MCU bridge connector. The MCU bridge connector is an interface between common KBC board and various KBC daughter boards. H8S/2117 EV board is consists of common KBC board and H8S/2117 daughter board. Below are the functions that designed in common KBC board.

- 16 x 8 matrix keyboard
- 3 PS/2 interface
- 2 SMBus/I2C channels
- CIR emitter
- TPM connector
- Sideband connector for Intel platform
- Smart card socket
- On board programming in boot mode
- E10A programming and debugging support

4. Keyboard Buffer Control Unit (PS/2) APIs

This common KBC board provides three keyboard buffer control unit (PS/2) channels. The PS/2 is provided with functions conforming to the PS/2 interface specifications. Data transfer using the PS/2 employs a data line (KD) and a clock line (KCLK), providing economical use of connectors, board surface area, etc. Below are the function calls contained in the **kbu.h** and **kbu.c** C source code files.

Function Type	Function name	note
Initialization functions	void KBU_init(unsigned char channel);	
Transmit functions	unsigned char transmitdata(unsigned char channel, BYTE data);	
Receive functions	BYTE getKBdata(unsigned char channel);	
Error functions	void kbreceiveabort(unsigned char channel); void kberrorhandling(unsigned char channel);	
Disable functions	void KBU_disable(unsigned char channel);	

There are four type functions in the C source file.

- Initialization functions: Initialize the operation of PS/2 modules.
- Transmit functions: Setup the command slot to transmit data.
- Receive functions: Setup the command slot to receive data.
- Error functions: check the error flag of the PS/2 module.
- Disable functions: Disable the PS/2 module.

5. I2C Bus Interface (IIC) APIs

This common KBC board provides two-channel I2C bus interface. The I2C bus interface conforms to and provides a subset of the Philips I2C bus (inter-IC bus) interface functions. The register configuration that controls the I2C bus differs partly from the Philips configuration, however. Below are the function calls contained in the **i2c.h**, **i2c0.h**, **i2c1.h**, **i2c.c**, **i2c0.c** and **i2c1.c** C source code files.

Function Type	Function name	note
Initialization functions	<pre>void I2C_init(unsigned char channel); void i2c0_set_slavereceive(void); void i2c1_set_slavereceive(void);</pre>	
Transmit functions	<pre>unsigned char i2c0_senddata(BYTE sendingdata); unsigned char i2c1_senddata(BYTE sendingdata); unsigned char i2c0_sendbyte(I2C_DATA * i2cdata); unsigned char i2c1_sendbyte(I2C_DATA * i2cdata); unsigned char i2c0_quickcommand(I2C_DATA * i2cdata); unsigned char i2c1_quickcommand(I2C_DATA * i2cdata); unsigned char i2c0_writebyte(I2C_DATA * i2cdata); unsigned char i2c1_writebyte(I2C_DATA * i2cdata); unsigned char i2c0_writeword(I2C_DATA * i2cdata); unsigned char i2c1_writeword(I2C_DATA * i2cdata); unsigned char i2c0_processcall(I2C_DATA * i2cdata); unsigned char i2c1_processcall(I2C_DATA * i2cdata); unsigned char i2c0_writeblock(I2C_DATA * i2cdata); unsigned char i2c1_writeblock(I2C_DATA * i2cdata);</pre>	
Receive functions	<pre>unsigned char i2c0_readbyte(I2C_DATA * i2cdata); unsigned char i2c1_readbyte(I2C_DATA * i2cdata); unsigned char i2c0_readword(I2C_DATA * i2cdata); unsigned char i2c1_readword(I2C_DATA * i2cdata); unsigned char i2c0_readblock(I2C_DATA * i2cdata); unsigned char i2c1_readblock(I2C_DATA * i2cdata); unsigned char i2c0_receiveword(I2C_DATA * i2cdata); unsigned char i2c1_receiveword(I2C_DATA * i2cdata); unsigned char i2c0_receivebyte(I2C_DATA * i2cdata); unsigned char i2c1_receivebyte(I2C_DATA * i2cdata); unsigned char i2c0_receivedata(BYTE * receivedata); unsigned char i2c1_receivedata(BYTE * receivedata);</pre>	
Disable functions	<pre>void I2C_disable(unsigned char channel);</pre>	

There are four type functions in the C source file.

- Initialization functions: Initialize the operation of I2C modules.
- Transmit functions: Setup the command slot to transmit data.
- Receive functions: Setup the command slot to receive data.
- Disable functions: Disable the I2C module.

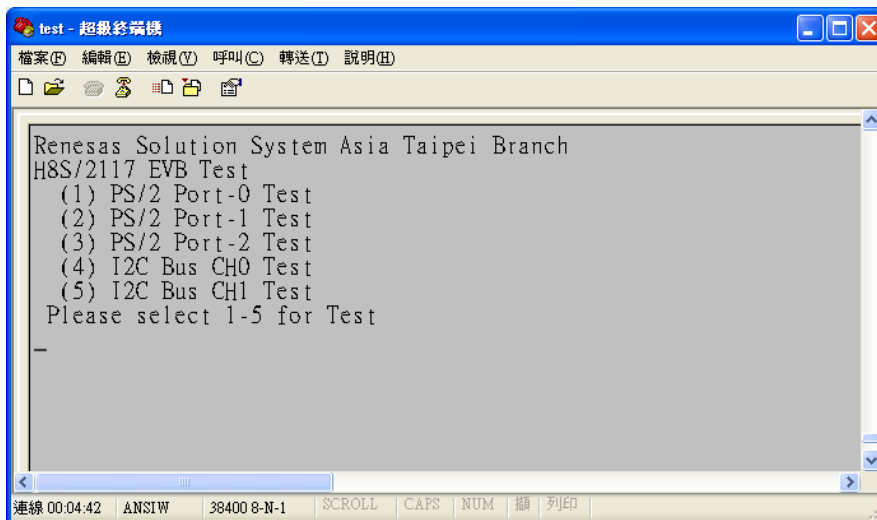
6. UART Display on Hyper Terminal Setup

This sample code will display menu through UART, SCI channel 1 interface.

Please set terminal as following.

- Baud rate: 38400
- Data bit: 8
- Bit check: none
- Stop bit: 1
- Stream control: none

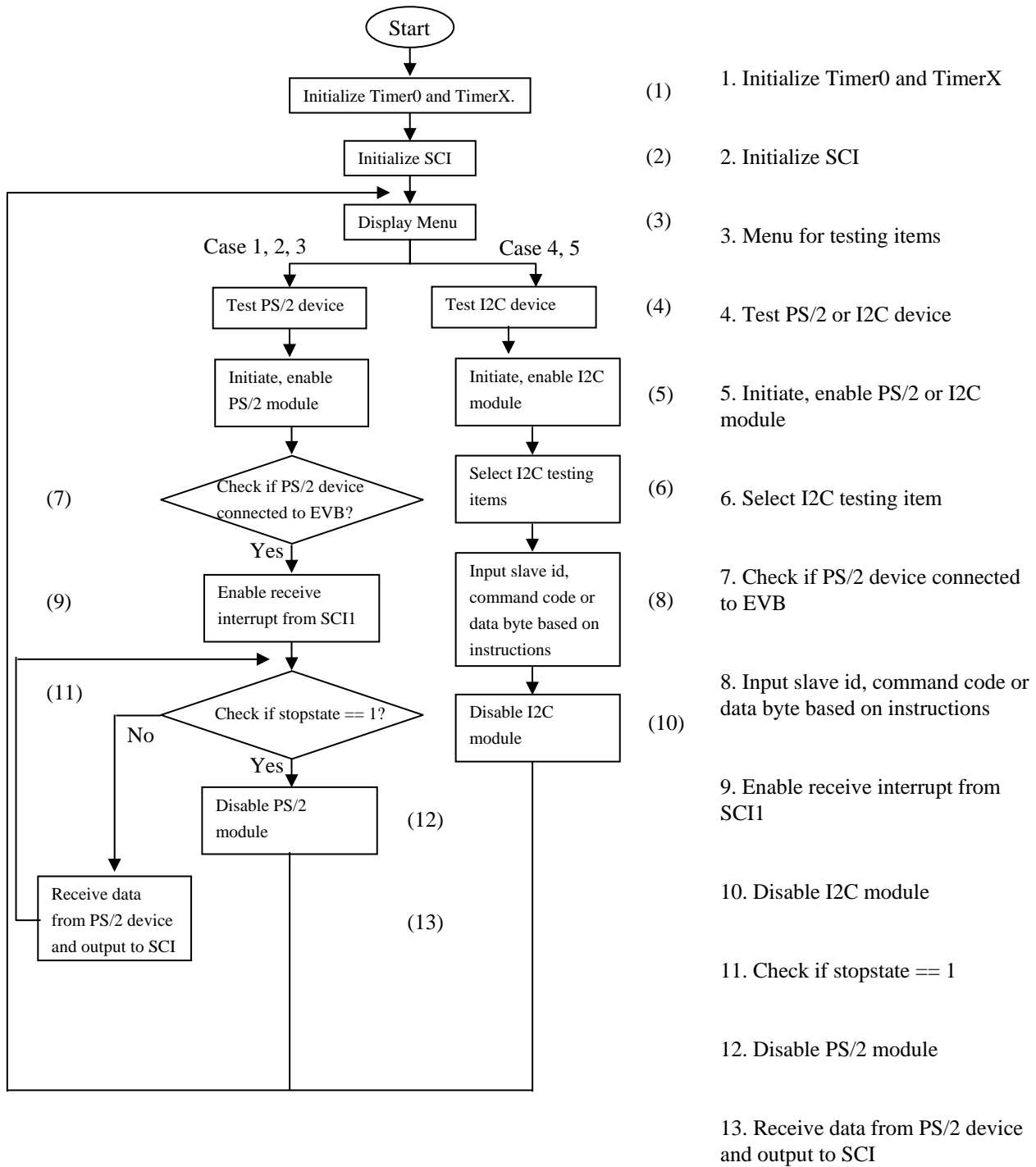
After connection success and run H8S/2117 common KBC board sample code, terminal shows as the figure below.



```

Renesas Solution System Asia Taipei Branch
H8S/2117 EVB Test
(1) PS/2 Port-0 Test
(2) PS/2 Port-1 Test
(3) PS/2 Port-2 Test
(4) I2C Bus CH0 Test
(5) I2C Bus CH1 Test
Please select 1-5 for Test
-
  
```


7. Program Flowchart



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csc@renesas.com

Revision Record of H8S/2117 KBC Sample Code

Rev.	Date	Description	
		Page	Summary
1.00	Jun.23.09	-	First edition issued
1.10	Dec.11.09		Change document name

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