

SH-2A

R20AN0050EJ0102

Rev.1.02

TCP/IP for Embedded system M3S-T4-Tiny: Introduction Guide

Aug 30, 2011

Introduction

This document explains M3S-T4-Tiny for the SH-2A V.1.04 Release00E (hereafter referred to as "T4") that depends on MCUs.

T4 is the TCP/IP protocol stack for embedded system. T4 is provided as library format and user can develop own system with this library to use TCP/IP function.

Target Device

SH-2A

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1. Structure of product

M3S-T4-Tiny for the SH-2A V.1.04 Release00E

M3S-T4-Tiny for the SH-2A V.1.04 Release00E Introduction Guide (r20an0050ej0102_sh2a_t4.pdf)

Part number of this product : R0M02A0PT0020RRC

This product includes files below.

table.1 T4 product files

name	description
installer(setup.exe)	For Windows installer. Installer will show the T4 product agreement. If user admits this agreement, installer will copy the T4 file to the path below. [Free version] C:\Renesas\an_r20an0050ej_sh2a_t4_v104r00 [Version for a fee] C:\Renesas\an_r20an0050ej_sh2a_t4_v104r00p * There is no difference of the data included in these.
T4 Library(lib)	
T4_Library_sh2a_ether.lib	SH-2A Library file
T4_Library_sh2a_fpu_ether.lib	ver 1.04(For the Ethernet)
r_t4_itcpip.h	T4 header file
sample driver (drv)	
ether common inc	Ethernet sample driver for SH7216 Excerpt from R01AN0289EJ0211 http://am.renesas.com/products/mpumcu/superh/sh7216/sh7216/Application_Notes.jsp
sample program(sample)	
Ether.hws	HEW Project file
document(doc)	
r20uw0031ej0103_t4tiny.pdf	User's manual
r20uw0032ej0102_t4tiny.pdf	Ethernet driver interface specification
r20an0050ej0102_sh2a_t4.pdf	Introduction Guide (this document)

2. Library specification

Library specification can be seen in user's manual included in T4-Tiny installer. T4-Tiny installer can be downloaded in Renesas Electronics Web site.

3. Corresponding MCU

This product corresponds to SH-2A series.

Library file is built with default compile option.

Please select using library with CPU option.

-cpu=sh2a T4_Library_sh2a_ether.lib
-cpu=sh2afpu T4_Library_sh2a_fpu_ether.lib

4. Development environment

-Host OS

Windows XP, Windows NT 4.0, Windows 2000, Windows Me, Windows 98, Windows 95

Requirement items

When user develops, choose newer version than below.

[Software]

-Integrated Development Environment

High Performance Embedded Workshop Version 4.09.00.007

-C compiler

SuperH RISC engine Standard Toolchain (V.9.4.0.0)

[Debug tools]

-Emulator debugger

E10A-USB emulator

-Emulator software

E10A-USB emulator software V.3.03 Release 00

[Board]

RSK+SH7216 (type : R0K572167C001BR)

5. T4 Ethernet sample application ROM / RAM / stack size

Sample application is made with settings below.

- * Reception buffer for sample application
-> Required RAM 1460 byte by 1 reception buffer.
- * Communication endpoints with 1460bytes reception window.
-> Required RAM 1460byte by 1 communication endpoint.
- * 8 Reception descriptors Entry for Ethernet driver.
-> Required RAM 256byte by 1 reception descriptor.

[Required memory1 : ROM/RAM size for Application (main.c, echo_srv.c (tcp non blocking call))]

```
ROM      :      about  220   byte
RAM      :      about  7068  byte
```

[Required memory2 : ROM/RAM size for T4 (T4_Library_sh2a_ether.lib)]

```
ROM      :      about  16170 byte
RAM      :      about   121   byte
```

[Required memory3 : ROM/RAM size for Ethernet driver (t4_driver.c, phy.c, r_eth.c)]

```
ROM      :      about   2225  byte
RAM      :      about   5974  byte
```

[stack size]

API	stack size (includes sample driver)	Function called from T4 Library
tcp_acp_cep	64	api_slp
tcp_con_cep	64	api_slp
tcp_rcv_dat	104	api_slp
tcp_snd_dat	68	api_slp
tcp_sht_cep	48	api_slp
tcp_cls_cep	56	api_slp
tcp_can_cep	24	api_slp
udp_rcv_dat	80	api_slp
udp_snd_dat	40	api_slp
udp_can_cep	20	dis_int ena_int
tcpudp_get_ramsize	28	
tcpudp_open	84	tcpudp_act_cyc
_process_tcpip	308	api_wup api_slp rcv_buff_release lan_write lan_read lan_reset

This stack size table is for sample program of T4.

Use the "CallWalker" to check your system stack size. Because the stack size is changed in case "Changed compile option" and "Changed sample driver code", etc.

6. Version information

User can access T4 Library information with valuable below.

```
extern const char _T4_Version[];
```

SH-2A : "M3S-T4-Tiny version 1.04 for SH2A.(Aug 30 2011, 16:41:41)"

SH2A-FPU : "M3S-T4-Tiny version 1.04 for SH2A-FPU.(Aug 30 2011, 16:41:54)"

7. How to update Ethernet sample driver

In case update sample Ethernet driver shown in Renesas web site, user overwrite directories "ether" and "common" from sample Ethernet driver to T4 sample program's HEW.

And correct 3 files after this.

1. resetprg.c line98 comment out (if system dose not use FPU)
 // set_fpscr(FPSCR_Init);
2. intrpg.c line47 comment out
 //#include "clock-arch.h"
3. intrpg.c line 324 comment out existing processing, add timer interrupt function "timer_interrupt();" and CMF clear.
 CMT0.CMCSR.BIT.CMF = 0;
 CMT0.CMCSR.BIT.CMF; /* Dummy Read */
 timer_interrupt();
 //int_cmt0_isr();
4. intrpg.c line 350 add Ethernet interrupt function "lan_rcv_handler();"
 lan_rcv_handler();
5. intrpg.c add extern
 extern void lan_rcv_handler(void);
 extern void timer_interrupt(void);
6. add 10ms timer program into hwsetup.c
 add extern : extern void io_init_cmt0(void);
 add call this function : in function HardwareSetup();
 implement io_init_cmt0() : in HardwareSetup.c

```

/* "FUNC COMMENT" *****
* ID                 :
* Outline            : CMT0 setting
* -----
* Include            : #include "iodefine.h"
* -----
* Declaration        : void io_init_cmt0(void);
* -----
* Description        : Sets CMT0 as the fixed-cycle timer for 10 msec
* -----
* Argument           : void
* -----
* Return Value      : void
* -----
* Note               : None
* "FUNC COMMENT END" *****/
void io_init_cmt0(void)
{
  /* ==== CMT0 setting ==== */
  /* ---- CMSTR setting ---- */
  CMT.CMSTR.BIT.STR0 = 0x0;             /* Count stop */
  /* ---- CMCSR0 setting ---- */
  CMT0.CMCSR.WORD = 0x0043;            /* Pclock/512 */
  /* ---- CMCNT0 setting ---- */
  CMT0.CMCNT = 0x0000;                 /* Timer counter clear */
  /* ---- CMCOR0 setting ---- */
  CMT0.CMCOR = 976;                    /* Set time = 10msec. */
  /* ---- CMSTR setting ---- */
  CMT.CMSTR.BIT.STR0 = 0x1;            /* Count start */
}

```

8. Notes

- Specify the size of 15bit or less for the third argument "INT len" of tcp_rcv_dat() and tcp_snd_dat().
- Specify the size of 15bit or less for the fourth argument "TMO tmout" of tcp_rcv_dat() and tcp_snd_dat().
- The MAC address of the sample program is stored in _myethaddr variable of config_tcpudp.c.
Change an initial value of the myethaddr variable if necessary according to the system.
- Sample Ethernet driver sets buffer size to 256(BUFSIZE in eth.h), please change this value for your system.
1520 is recommended.

9. Library version information

ver	change	release date
1.04	function addition Add Ethernet driver function "report_error". Add variable "_udp_zerochecksum" for behavior of UDP sum check.	Aug.30.11
1.03	bug fix -case When user use RI600/4(Renesas uITRON) with T4, User definition function "api_wup()" has no way to know which communication endpoint is ended. -measures Change "api_wup()" argument. To know which communication endpoint is ended.	Feb.02.11
1.02	bug fix -case When user use RI600/4(Renesas uITRON) with T4, conflict r_t4_itcpip and itron.h. -measures fixed r_t4_itcpip.h	internal use
1.01	bug fix -case When T4 uses API "tcp_snd_dat" with condition that other endpoint becomes zerowindow, and other endpoint returns ACK with enough window size. T4 (sender) continues zerowindow probe, and other endpoint returns ACK with enough window size. This condition makes T4 not to be able to update remote window size and hung-up. -measures When T4 judges "other endpoint is zerowindow", and other endpoint returns ACK with enough window size, T4 retransfers previous data. (not zerowindow probe)	Nov.10.10
1.00	first release	Oct.09.10

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Update information

Rev.	Date	Description	
		Page	Summary
1.02	Aug.30.11	—	Release with T4 library ver 1.04
1.01	Feb.02.11	—	Release with T4 library ver 1.03
1.00	Nov.10.10	—	First edition issued

General Precautions in the Handling of MPU/MCU Products

The following usage notes are applicable to all MPU/MCU products from Renesas. For detailed usage notes on the products covered by this manual, refer to the relevant sections of the manual. If the descriptions under General Precautions in the Handling of MPU/MCU Products and in the body of the manual differ from each other, the description in the body of the manual takes precedence.

1. Handling of Unused Pins

Handle unused pins in accord with the directions given under Handling of Unused Pins in the manual.

- The input pins of CMOS products are generally in the high-impedance state. In operation with an unused pin in the open-circuit state, extra electromagnetic noise is induced in the vicinity of LSI, an associated shoot-through current flows internally, and malfunctions occur due to the false recognition of the pin state as an input signal become possible. Unused pins should be handled as described under Handling of Unused Pins in the manual.

2. Processing at Power-on

The state of the product is undefined at the moment when power is supplied.

- The states of internal circuits in the LSI are indeterminate and the states of register settings and pins are undefined at the moment when power is supplied.

In a finished product where the reset signal is applied to the external reset pin, the states of pins are not guaranteed from the moment when power is supplied until the reset process is completed.

In a similar way, the states of pins in a product that is reset by an on-chip power-on reset function are not guaranteed from the moment when power is supplied until the power reaches the level at which resetting has been specified.

3. Prohibition of Access to Reserved Addresses

Access to reserved addresses is prohibited.

- The reserved addresses are provided for the possible future expansion of functions. Do not access these addresses; the correct operation of LSI is not guaranteed if they are accessed.

4. Clock Signals

After applying a reset, only release the reset line after the operating clock signal has become stable.

When switching the clock signal during program execution, wait until the target clock signal has stabilized.

- When the clock signal is generated with an external resonator (or from an external oscillator) during a reset, ensure that the reset line is only released after full stabilization of the clock signal. Moreover, when switching to a clock signal produced with an external resonator (or by an external oscillator) while program execution is in progress, wait until the target clock signal is stable.

5. Differences between Products

Before changing from one product to another, i.e. to one with a different type number, confirm that the change will not lead to problems.

- The characteristics of MPU/MCU in the same group but having different type numbers may differ because of the differences in internal memory capacity and layout pattern. When changing to products of different type numbers, implement a system-evaluation test for each of the products.

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