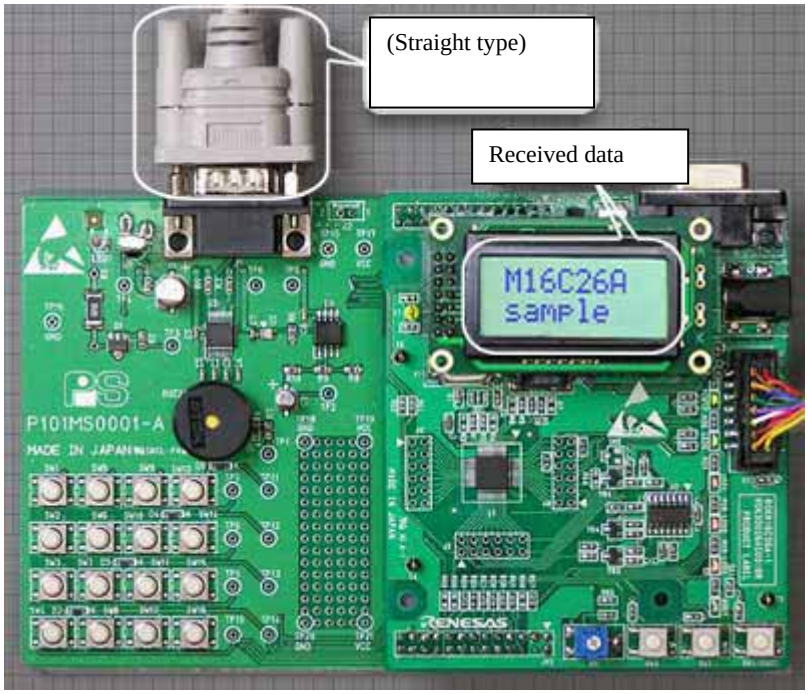
M16C/26A Group

Sample Program (Terminal Software)

1. Summary

This sample program shows the characters and numerals input from the keyboard of a PC on liquid crystal display by using the Renesas Starter Kit for M16C/26A (R0K33026AS000BE).



The extension board used here is a product from PI System Co., Ltd.

2. Introduction

The example described in this document applies to the microcomputers listed below:

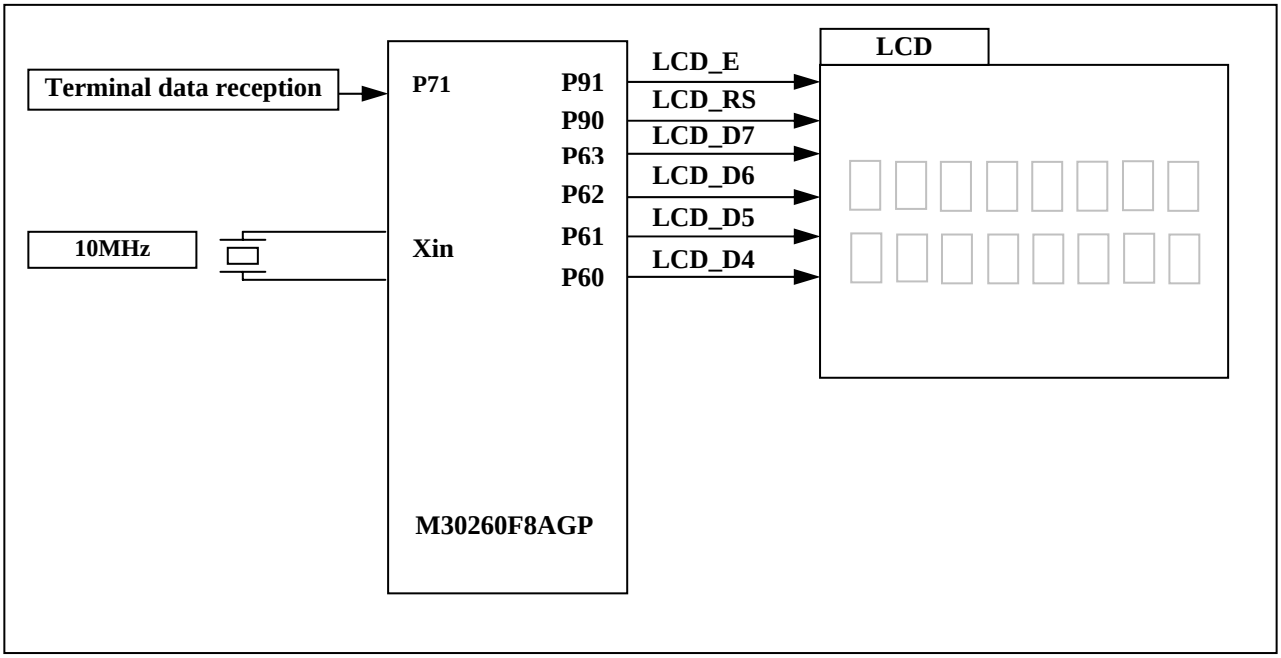
Microcomputers: M16C26A

This sample program runs on the Renesas Starter Kit for M16C/26A (R0K33026AS000BE).
Prepare an extension board available for the Renesas Starter Kit or create a circuit similar to the one shown in the example circuit on page 14 and then connect it to the Starter Kit.

This program uses RSK_LIB. For details about RSK_LIB, see the RSK_LIB reference manual. (RSK_LIB is the library software provided for use with the Renesas Starter Kit for M16C/26A.)

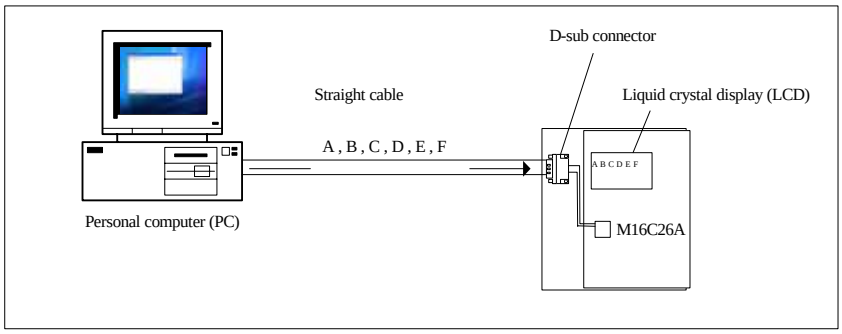
3. Port Arrangement

The terminal reception serial port and the buzzer are the facilities mounted on an extension board for the Renesas Starter Kit. To use these facilities, connect an extension board to the Starter Kit.



4. Operational Outline

When characters are input to HyperTerminal (keyboard of a PC), the program shows the input characters on liquid crystal display.
Connect the serial port (RS-232C) of a PC and the D-sub connecter on the microcomputer side with a straight cable, then enter characters in HyperTerminal. The input characters are shown on liquid crystal display along with a buzzer tone.
Up to 16 characters can be displayed, not including BS and TAB codes.



The operation described above is accomplished using the following microcomputer facilities:
• Timer A0 (timer mode, main 2 ms cycle)
This timer counts 2 milliseconds using the main clock of the microcomputer as the count source.
It is used as the basic timer of RSK_LIB.
Time management, key scan and LCD display management are performed using this timer.
• UART2 (clock-asynchronous serial I/O mode, data reception)
It produces a transfer clock from the main clock of the microcomputer to receive the data transmitted via HyperTerminal.
• Timer A1 (pulse modulation mode, buzzer output)
This timer outputs a waveform with different high and low pulse widths using the main clock of the microcomputer as the count source.
It is used to sound a buzzer to notify data reception at terminal.

5. Operational Specification

The data received from HyperTerminal is displayed.

Communication format

Baud rate: 9,600 bps

(In microcomputer, set at 9,615 bps)

Stop bit: 1

Parity: None

Number of characters received: 16

(Only up to 16 characters are accepted)

Received character codes written in ASCII

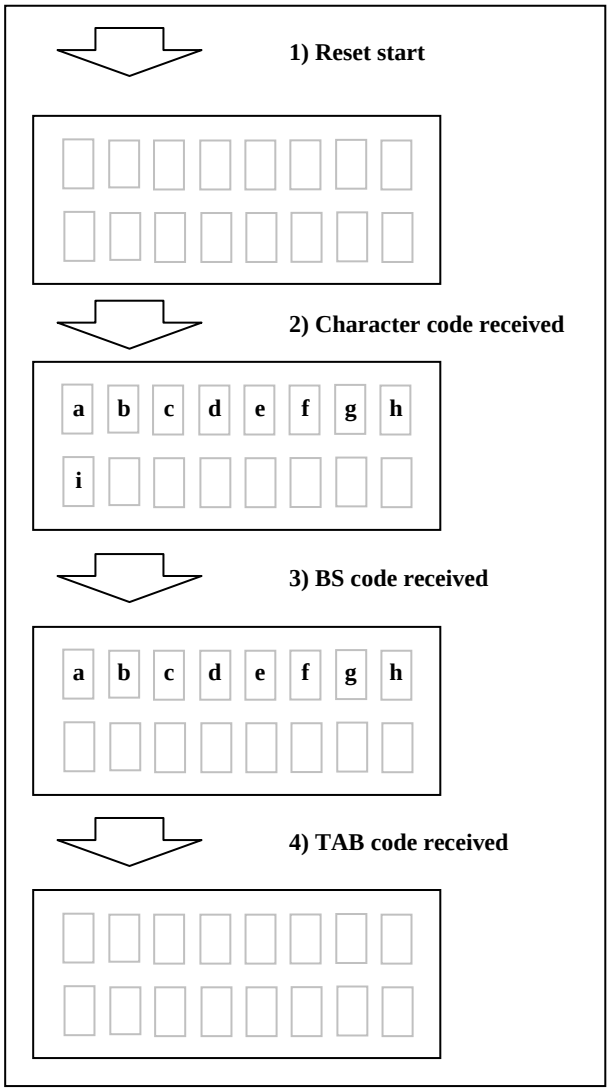
Control code

TAB (0x09): Clear

Entire received string is cleared

BS (0x08): Backspace

One character is cleared



6. Definition of the RSK Functionality and the RSK_LIB APIs and Common Functions Used by Terminal Software

6.1 Definition of the RSK Functionality

RSKdefine.h file

In this application, the following functionalities (those shown in red) are set.

```
/************************************************************
      The boot information on CPU is defined
      Usually, this mode is used
************************************************************/
#define _CPU_M16C26A_NORMAL_MOD
/* Use in low power mode can be performed. */
//#define _CPU_M16C26A_32KHZ_MOD
/* Use of access of a flash can be performed. */
//#define _CPU_M16C26A_DATAFLASF_USE
/************************************************************
      The hardware function which RSK supports is chosen
************************************************************/
//#define _USE_KEY
#define _USE_BUZZER
//#define _OPTION_USE_AD
#define _OPTION_USE_COM_RX
//#define _OPTION_USE_COM_TX
//#define _OPTION_USE_INFRAEDRX
//#define _OPTION_USE_INFRAEDTX
//#define _OPTION_USE_SW
//#define _OPTION_USE_LED
//#define _OPTION_USE_IO
```

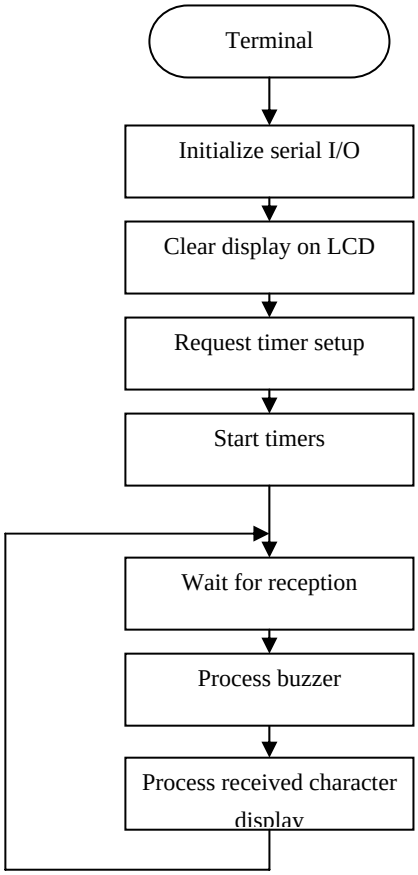
There are no individual definitions of selected functionality.

6.2 APIs and Common Functions Used

ApiStatusType RL_SetTimerReq(unsigned int TimerValue, char TimerMode, int *TimerNo, int *ERcode);
ApiStatusType RL_StartTimer(int TimerNo, int *ERcode);
ApiStatusType RL_CheckTimer(int TimerNo, int *ERcode);
ApiStatusType RL_Putc_Lcd(char Ylocation, char outc, int *ERcode);
ApiStatusType RL_Putc_LcdLoc(char Xlocation, char Ylocation, char RvTime, char outc, int *ERcode);
ApiStatusType RL_Open_Com(int bitlenght, int stopbit, int parity, int bps, int *ERcode);
ApiStatusType RL_Getc_Com(char *ComRxChar, int *ERcode);
ApiStatusType RL_Start_Buzzer(char freqNo, int *ERcode);
ApiStatusType RL_Stop_Buzzer(int *ERcode);
void RL_ErrorHook(int FuncNo, int ErrorNo);

For details about the APIs and common functions used by the sample program (terminal software), see the Renesas Starter Kit Library V.1.00 Reference Manual.

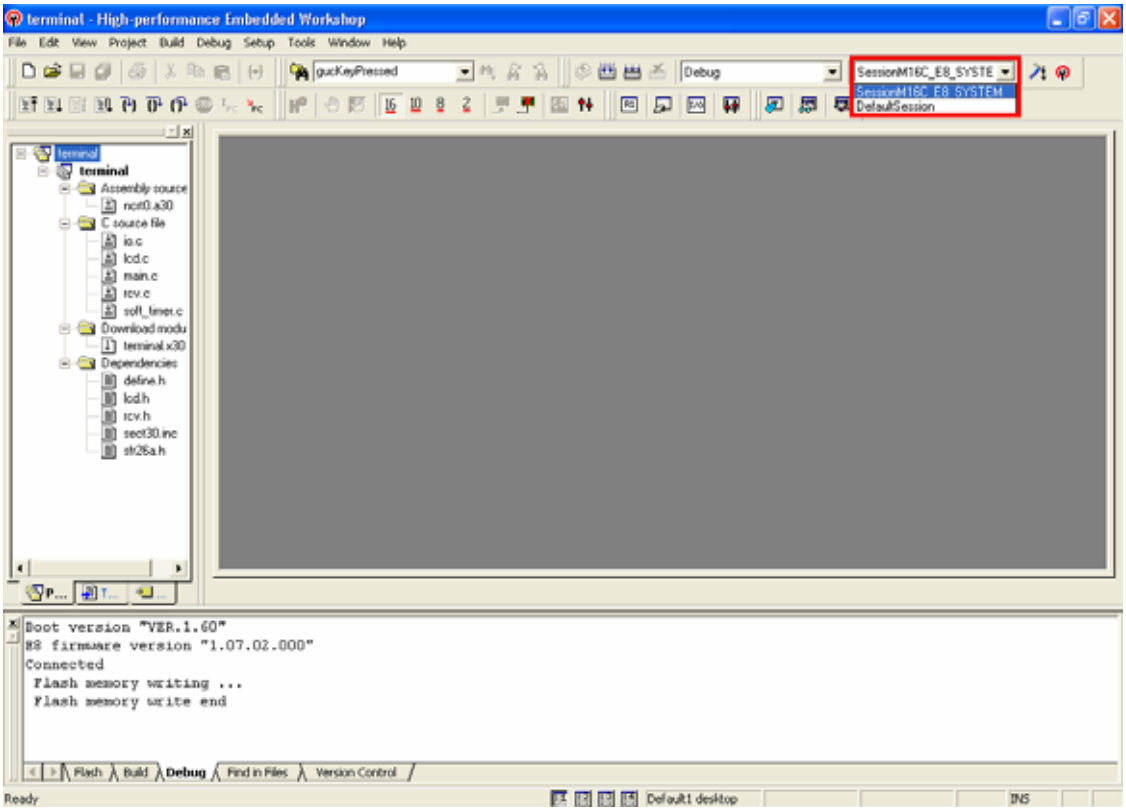
7. Flowchart


Terminal
Initialize serial I/O
Clear display on LCD
Request timer setup
Start timers
Wait for reception
Process buzzer
Process received character display

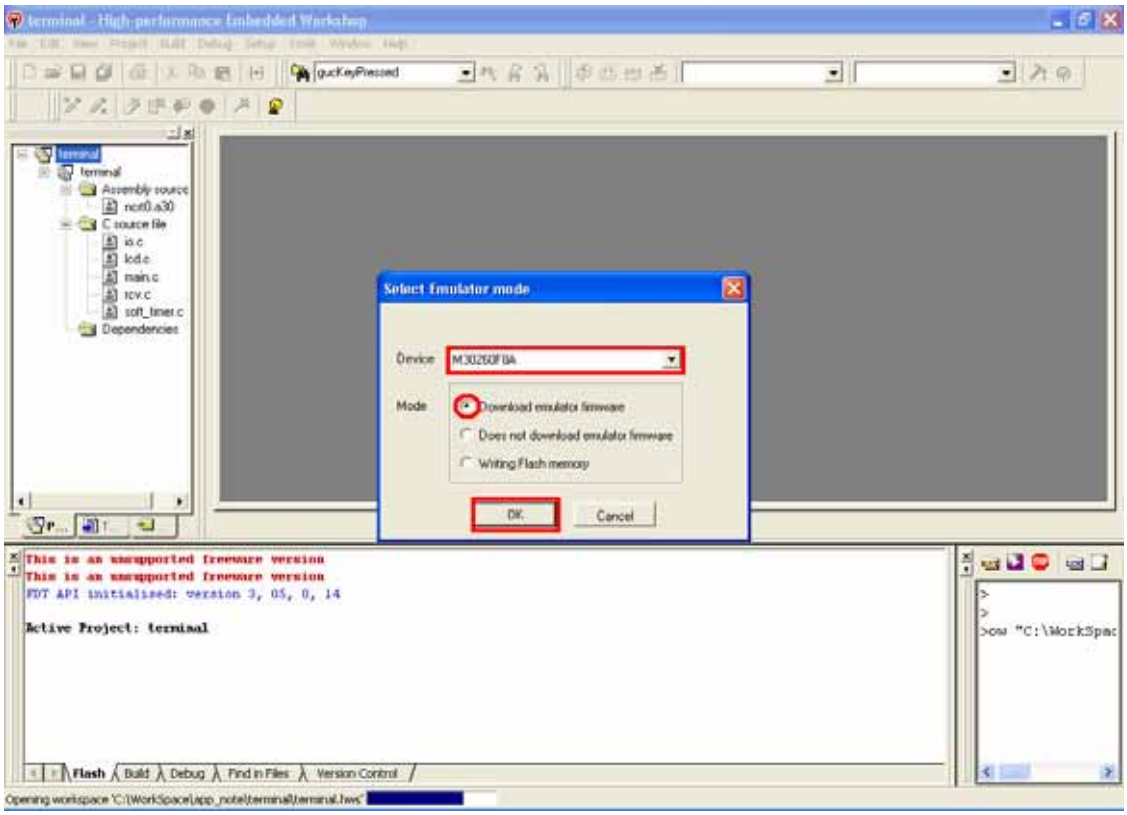
8. Tutorial

1. Launch the HEW by double-clicking its icon.

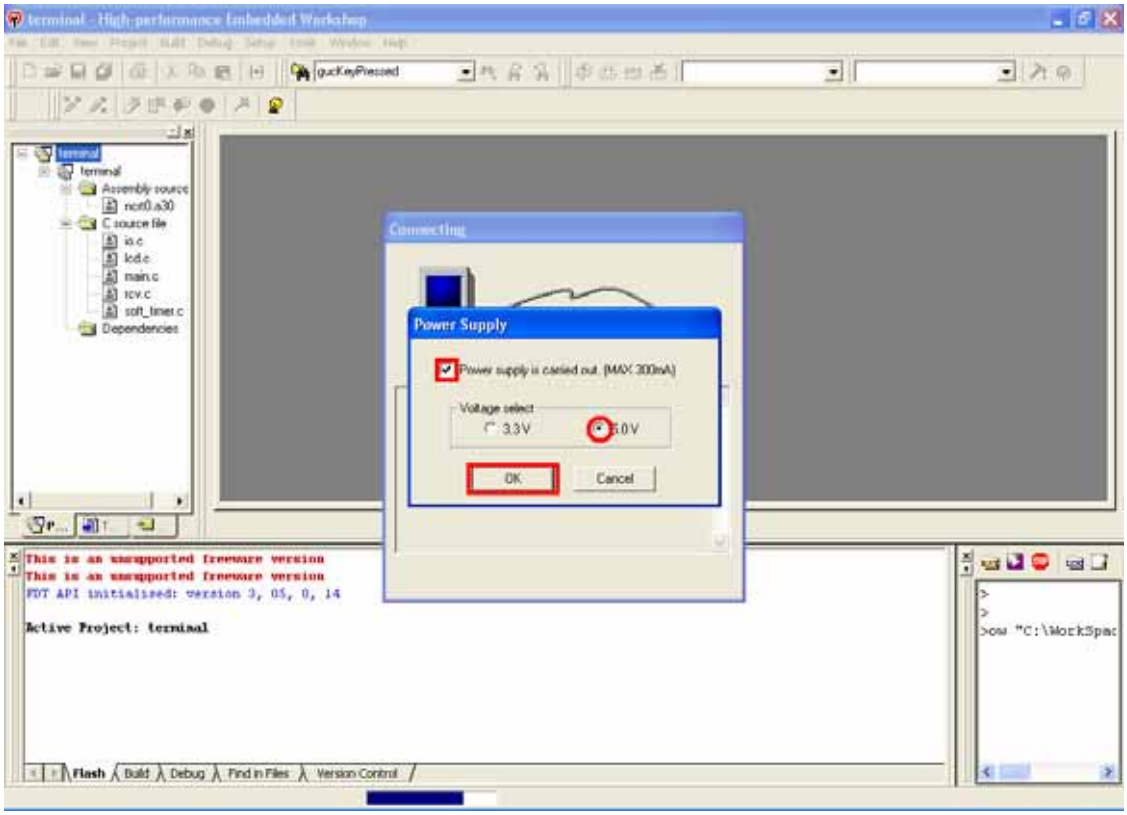
2. Change the session name from “default Session” to “SessionM16C_E8_System.”



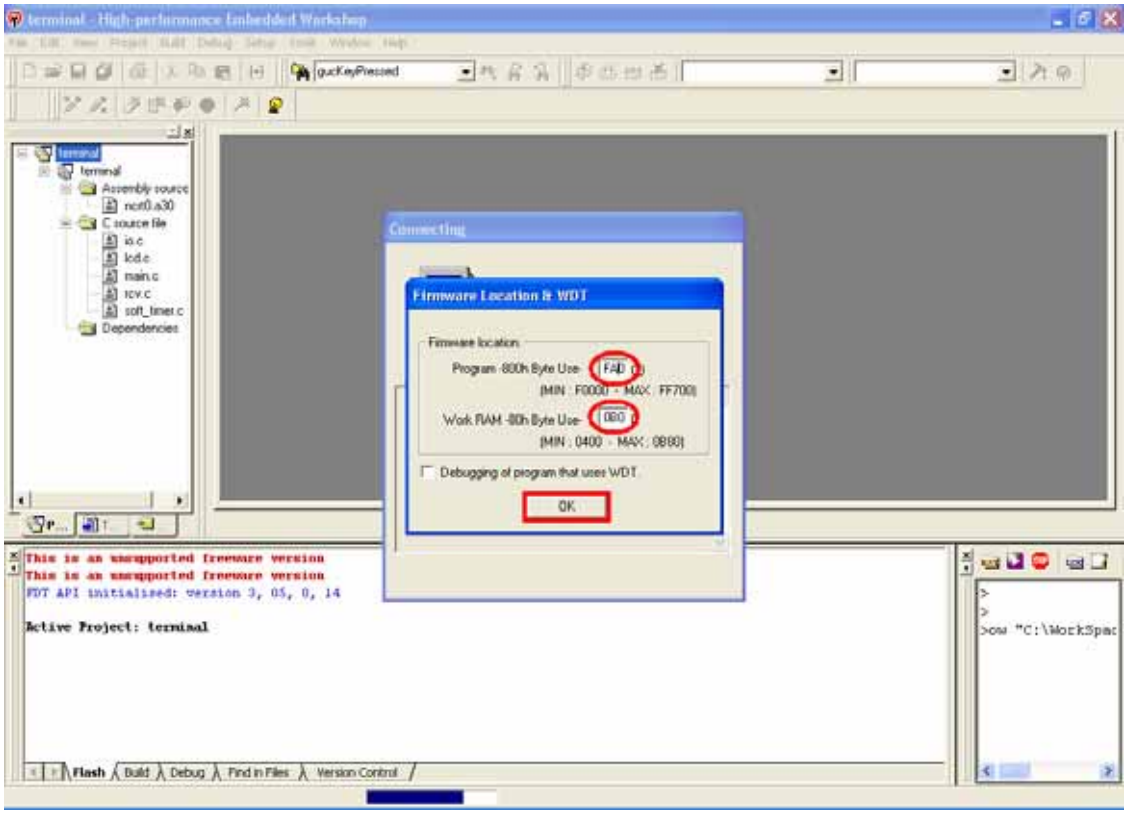
3. Select “M30260F8A” for Device.
Select “Download emulator firmware” for Mode.



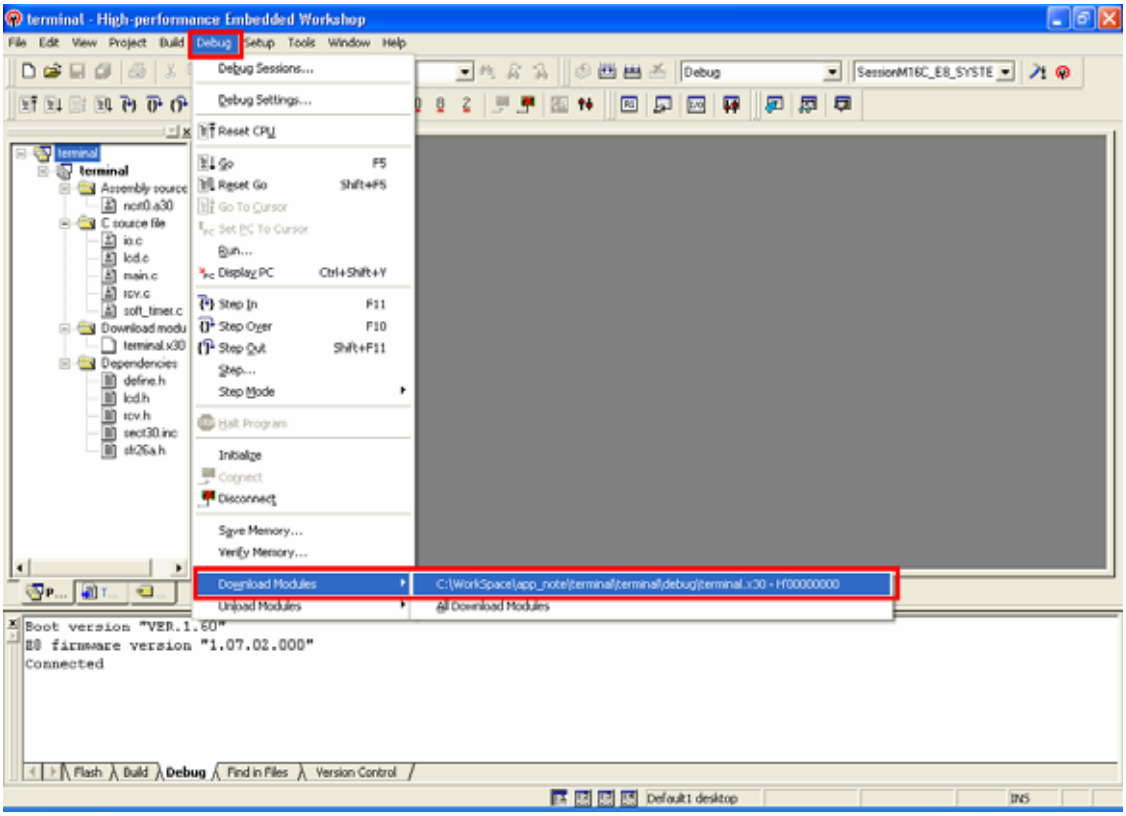
Check the box labeled “Power supply is carried out. (MAX 300mA)” and then select “5.0V.”



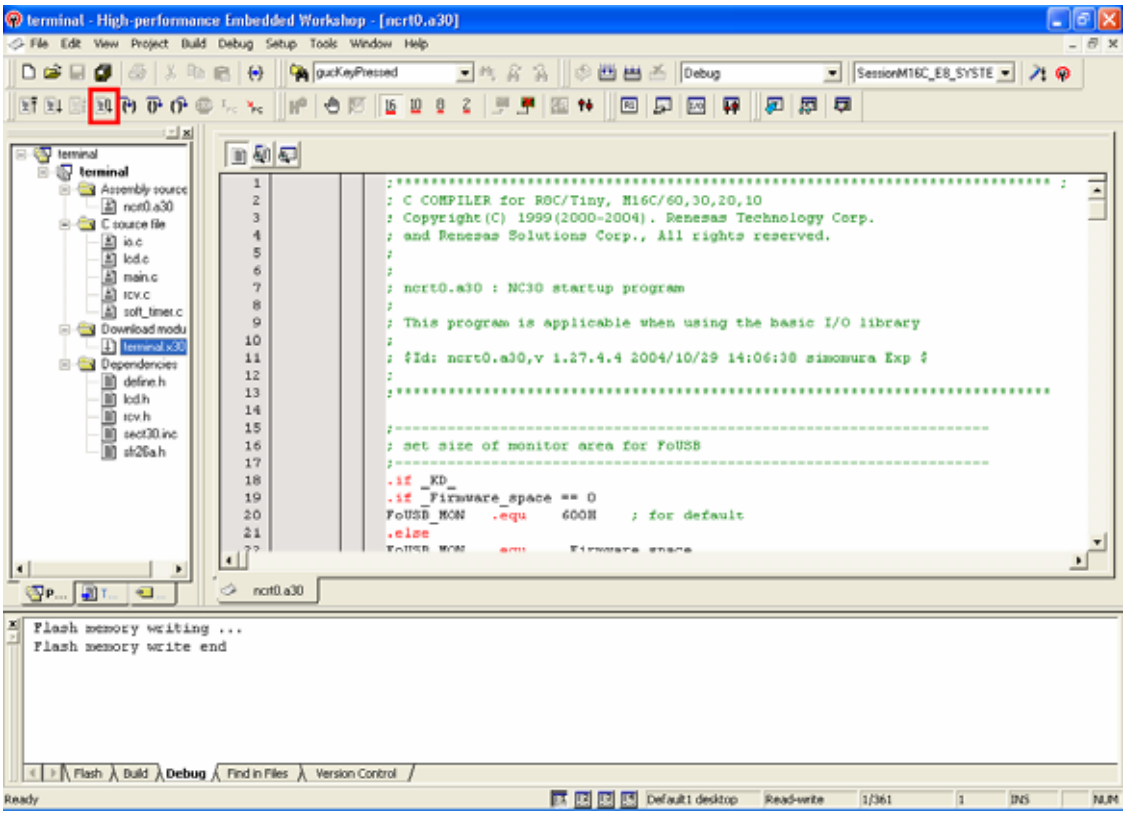
4. In the program and the work RAM text boxes of Firmware Location Address, enter “FA0” and “0B8” respectively. Leave the box labeled “Debug a program using the WDT” unchecked.



5. Choose Download from the Debug tab and download a module.
The upper-side choices for Download show the location from which a project was downloaded.

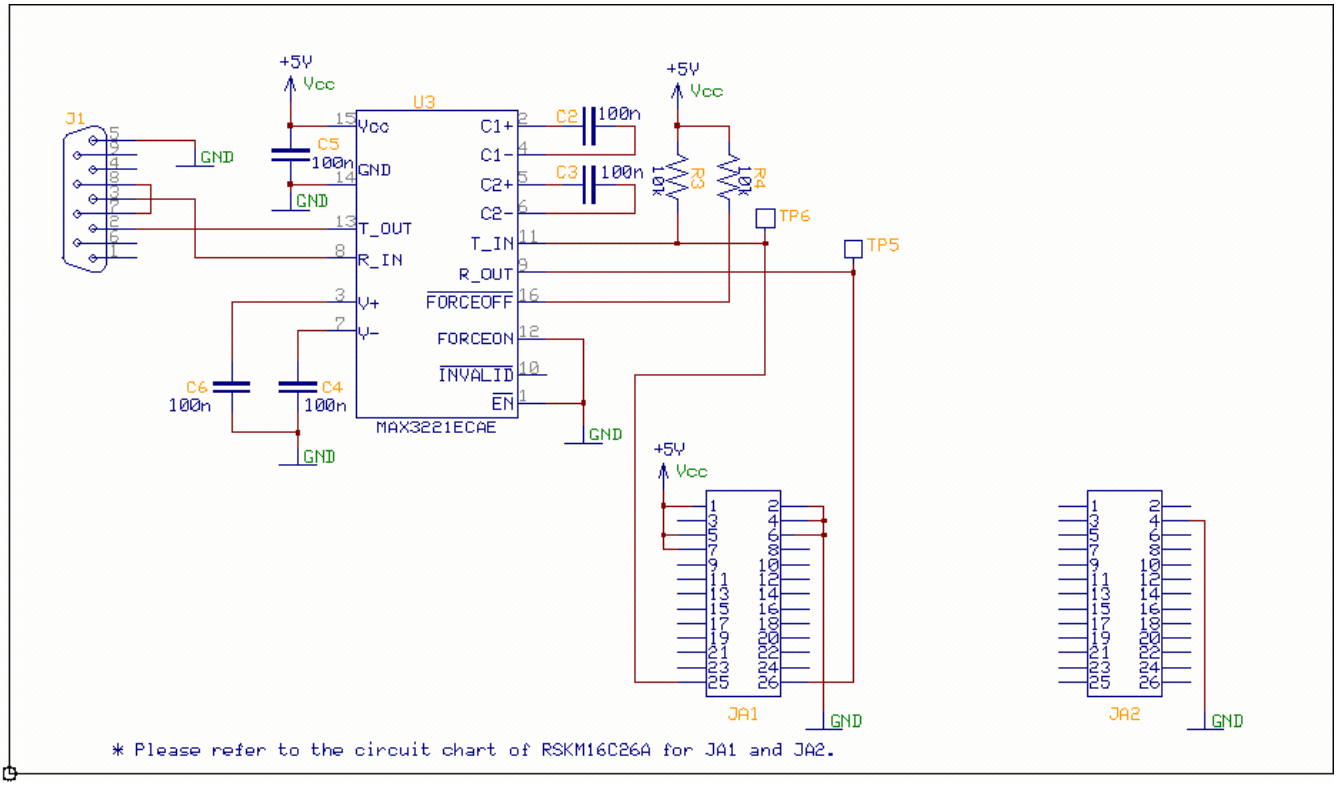


6. Click “Start after Reset” to start program execution.



7. Please do "Cancellation" when "The file is opened" window opens.

8. Example Circuit



9. Part List

Part name	Part No.	Q'ty	Manufacturer	Type number	Value	Remark
D-sub connector	J1	1			9pin	Male
RS232C driver	U3	1	Maxim	MAX3221ECAE		
Ceramic capacitor	C2 - C6	5	Panasonic	ECJ-1VF1H104Z	100n	
Resistor	R3,R4	2	ROHM	MCR10EZHF103	10k	1/8W, 5%
PCB header	JA1,JA2	2	Molex	10-88-1261	26pin	Male, 2-row, vertical type

10. Web Sitet

Renesas Technology Web site
http://www.renesas.com/

Revision History

Rev.	Date of issue	Content of revision	
		Page	Points
1.00	2006.06.30	-	First revision issued
1.10	2007.12.03	-	RSK_LIB APIs supported

Notes regarding these materials

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