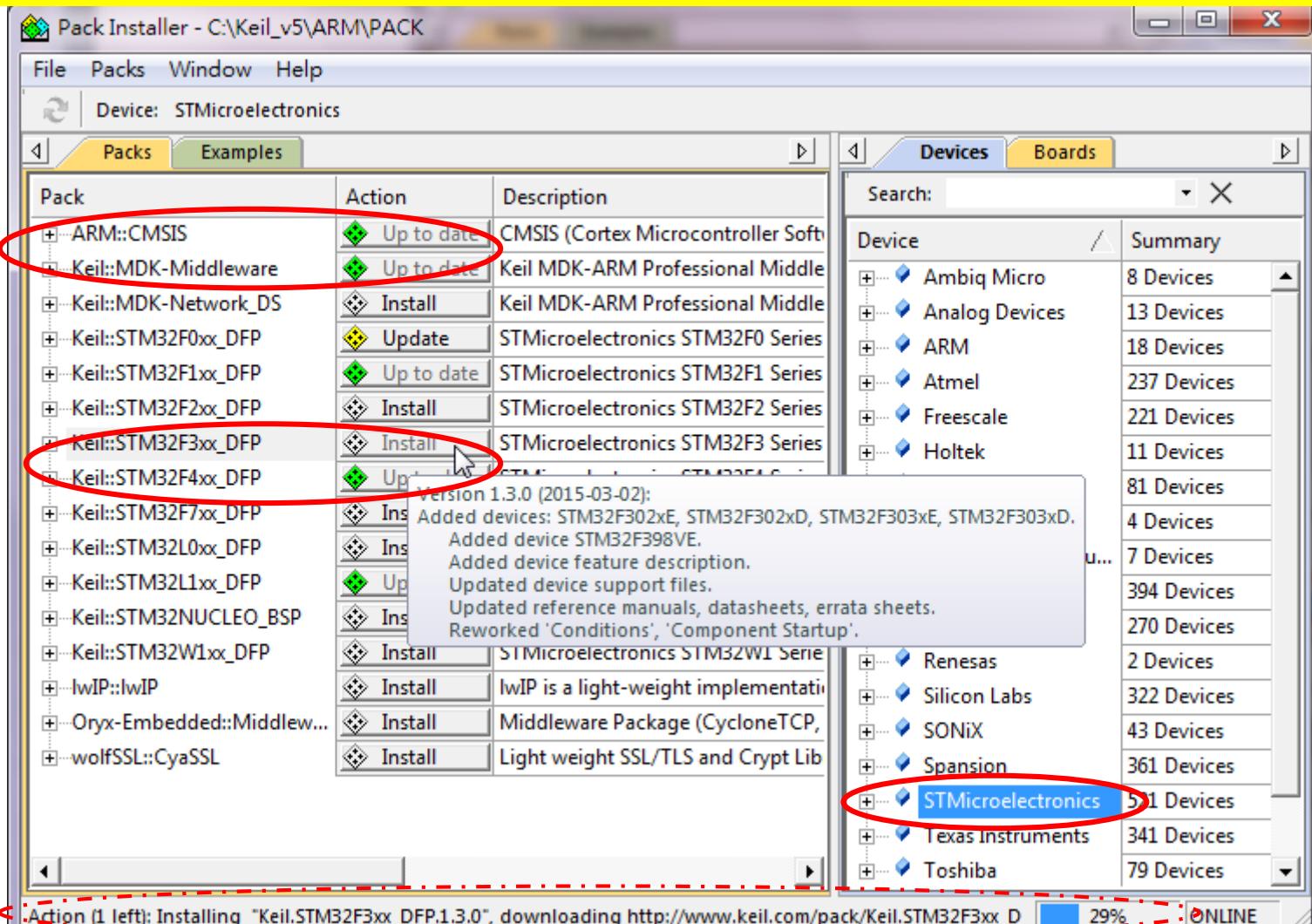


KEIL MDK

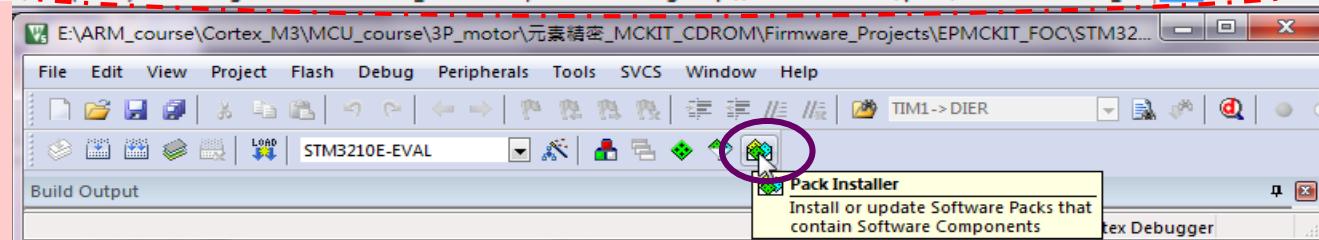
Tutorial

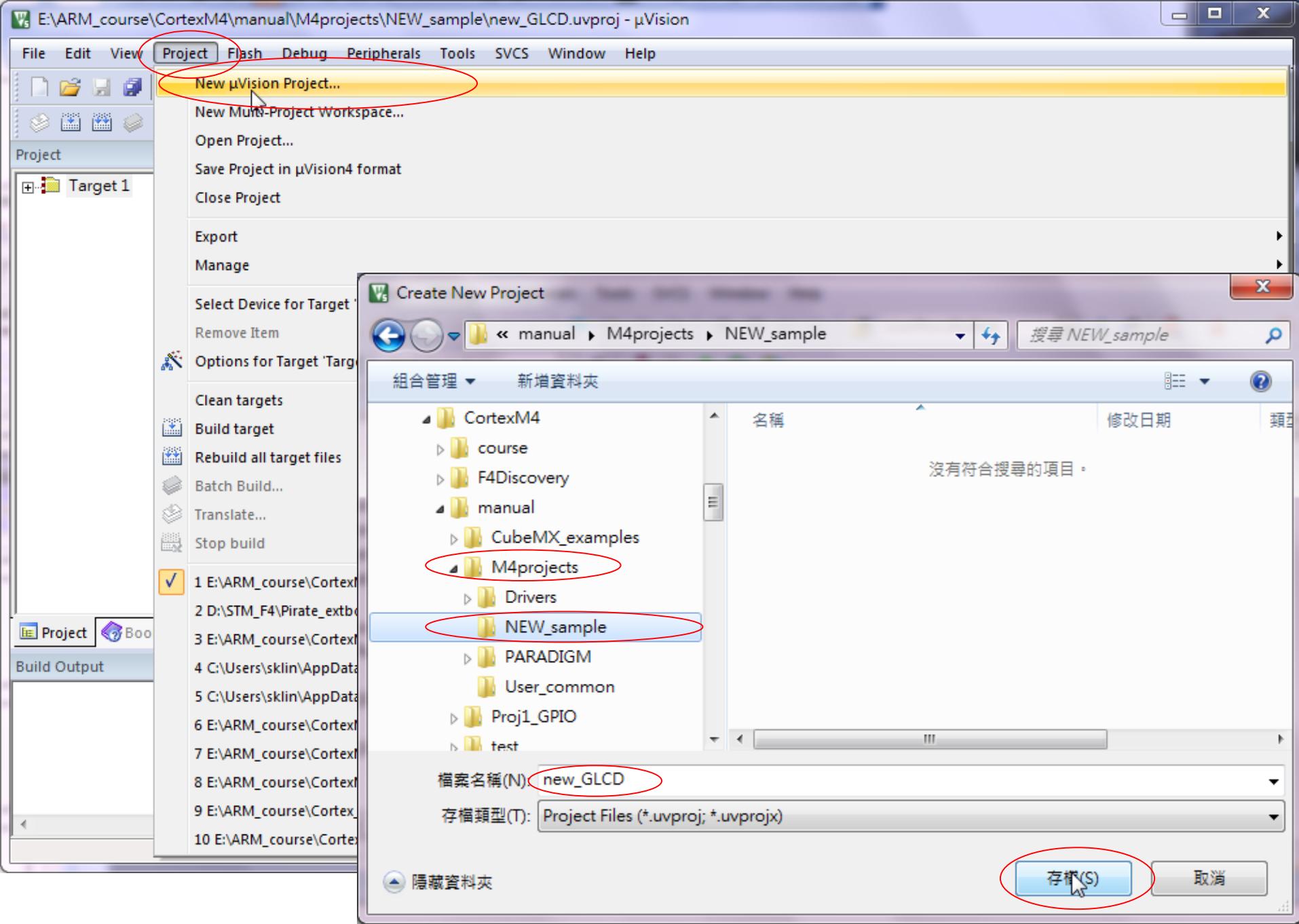
安裝mdk514.exe。安裝結束時，會要求網路連線來安裝Packs。

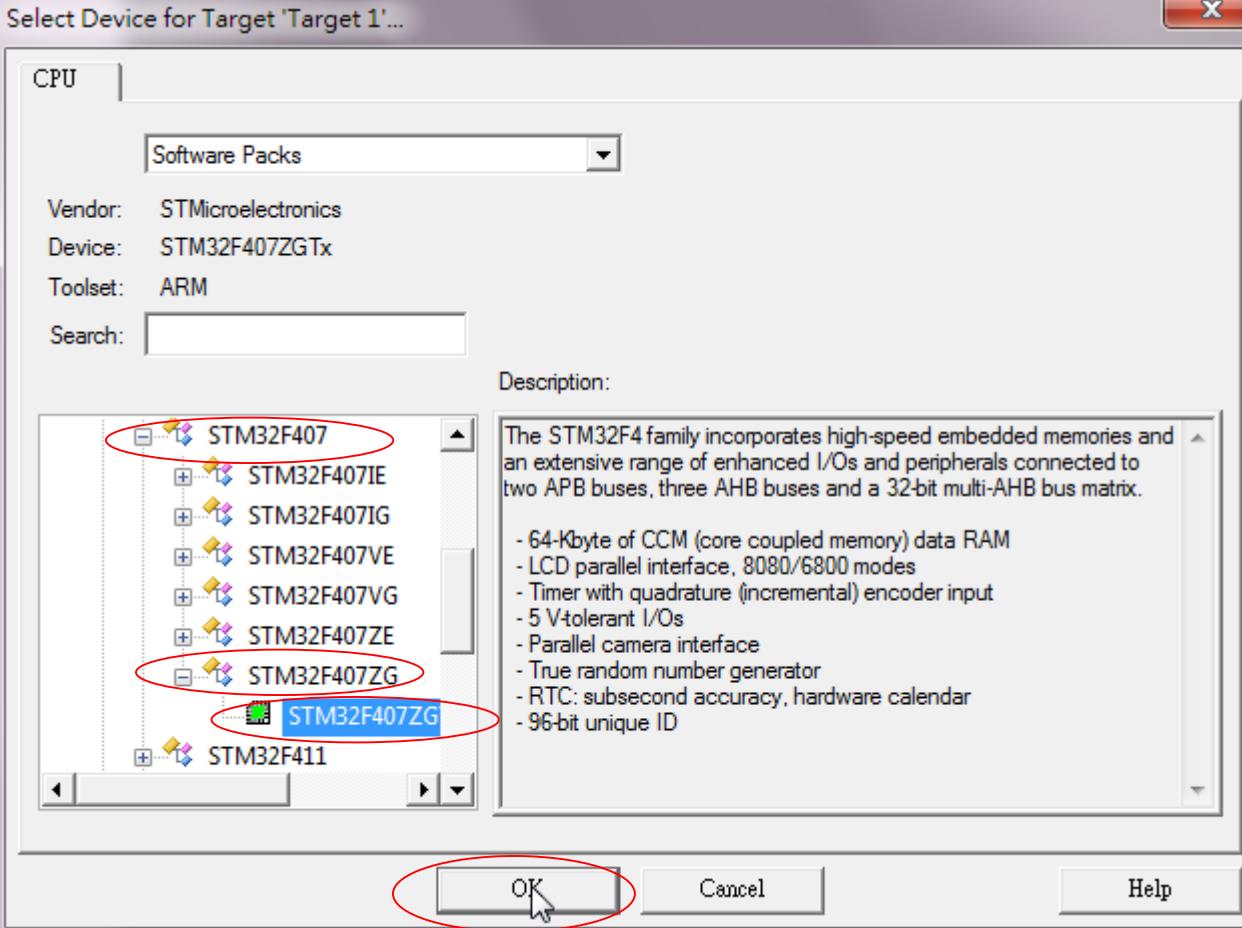
只要點擊” STMicroelectronics”，再點STM32F3xx_DFP的Install即可。

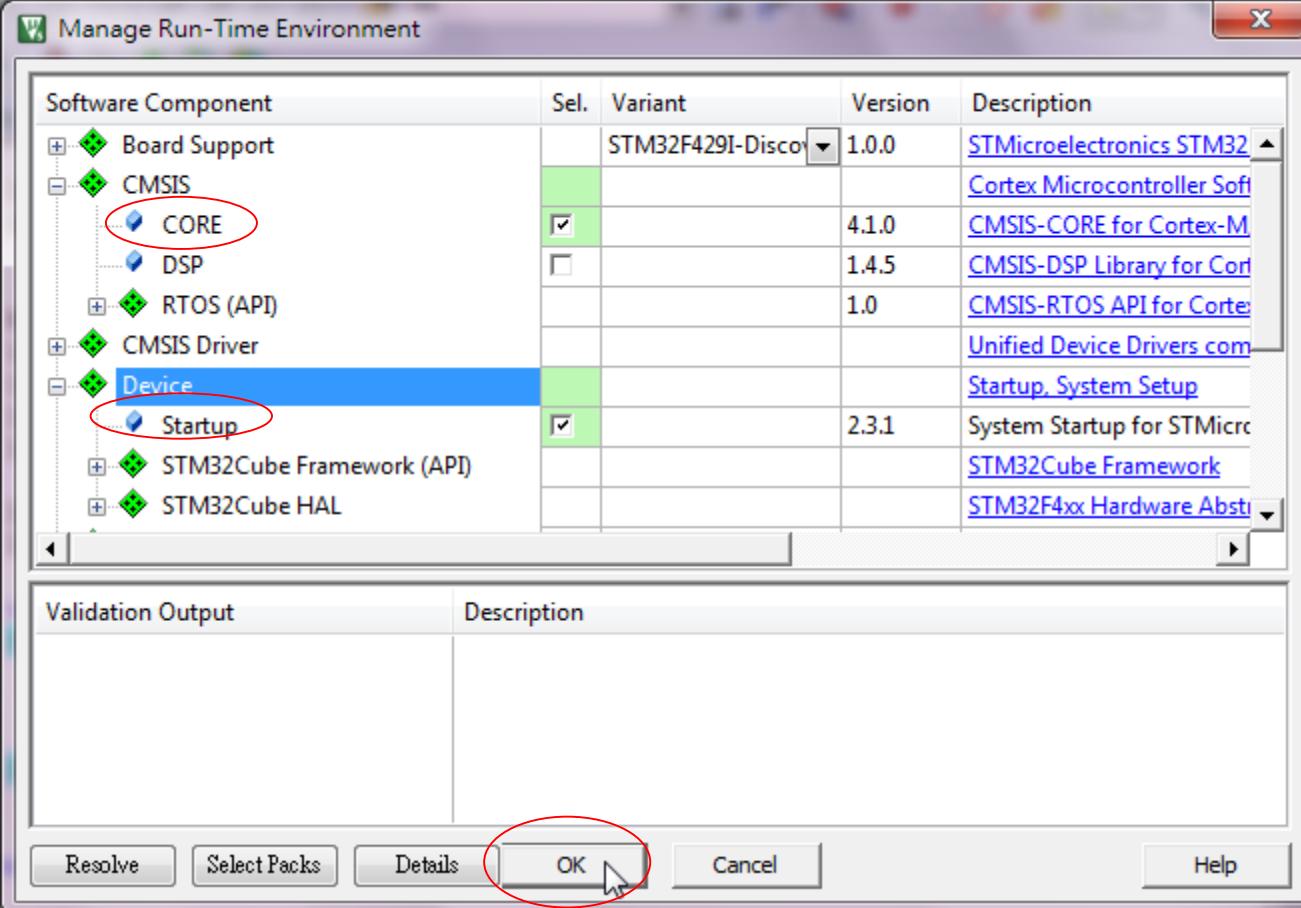


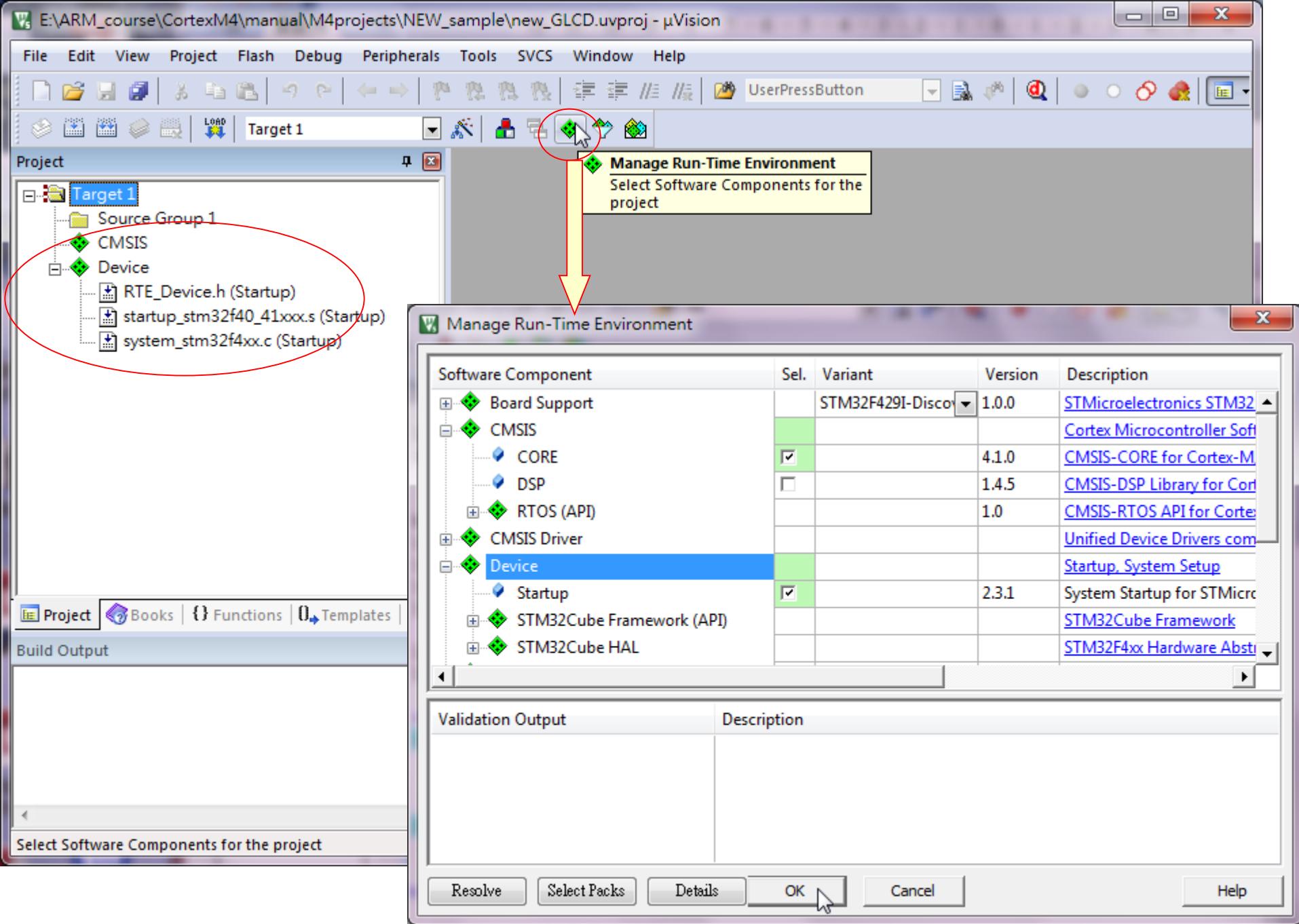
若忘了安裝Packs，可以在發展軟體MDK的視窗下點按Pack Install

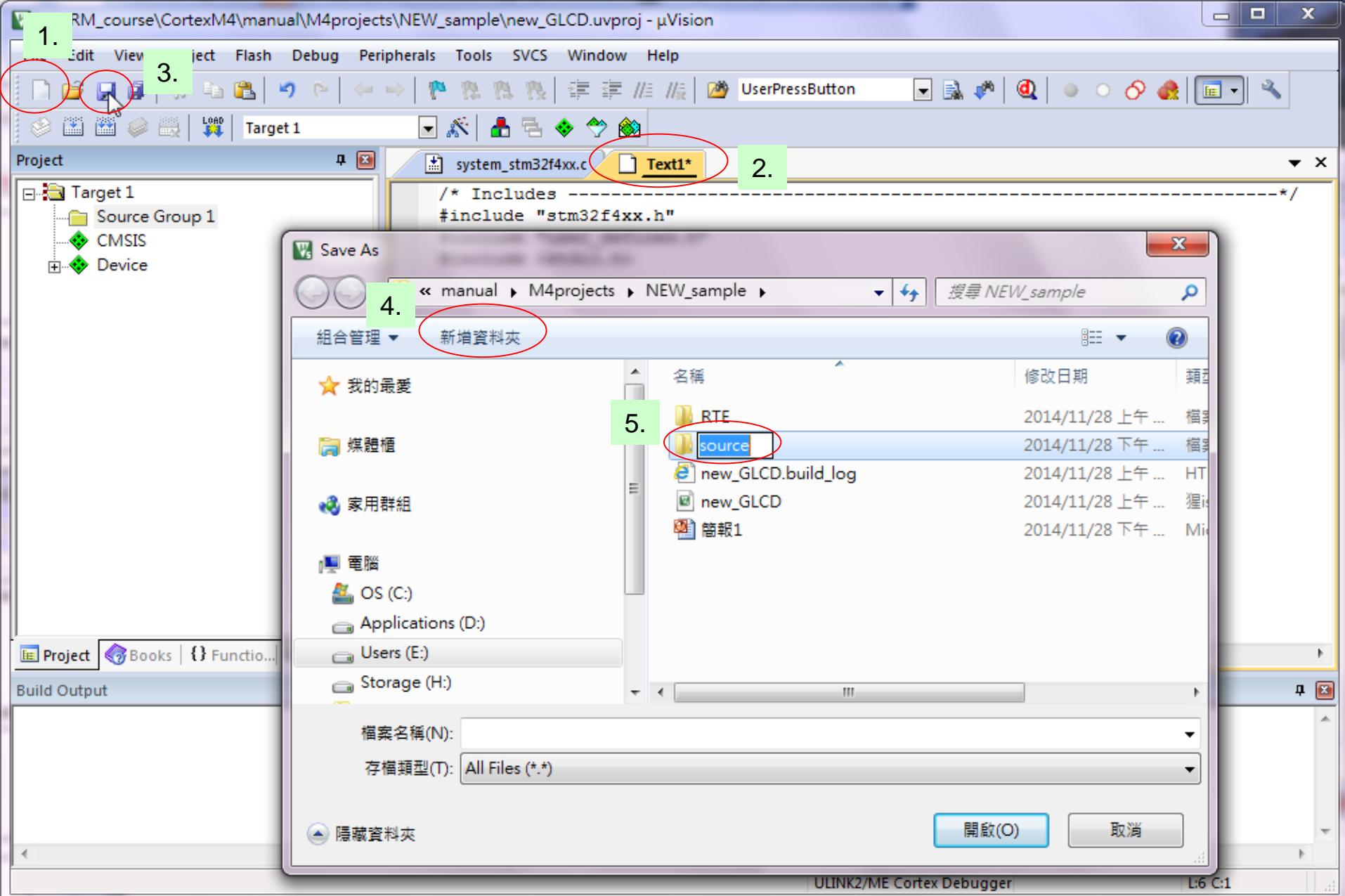


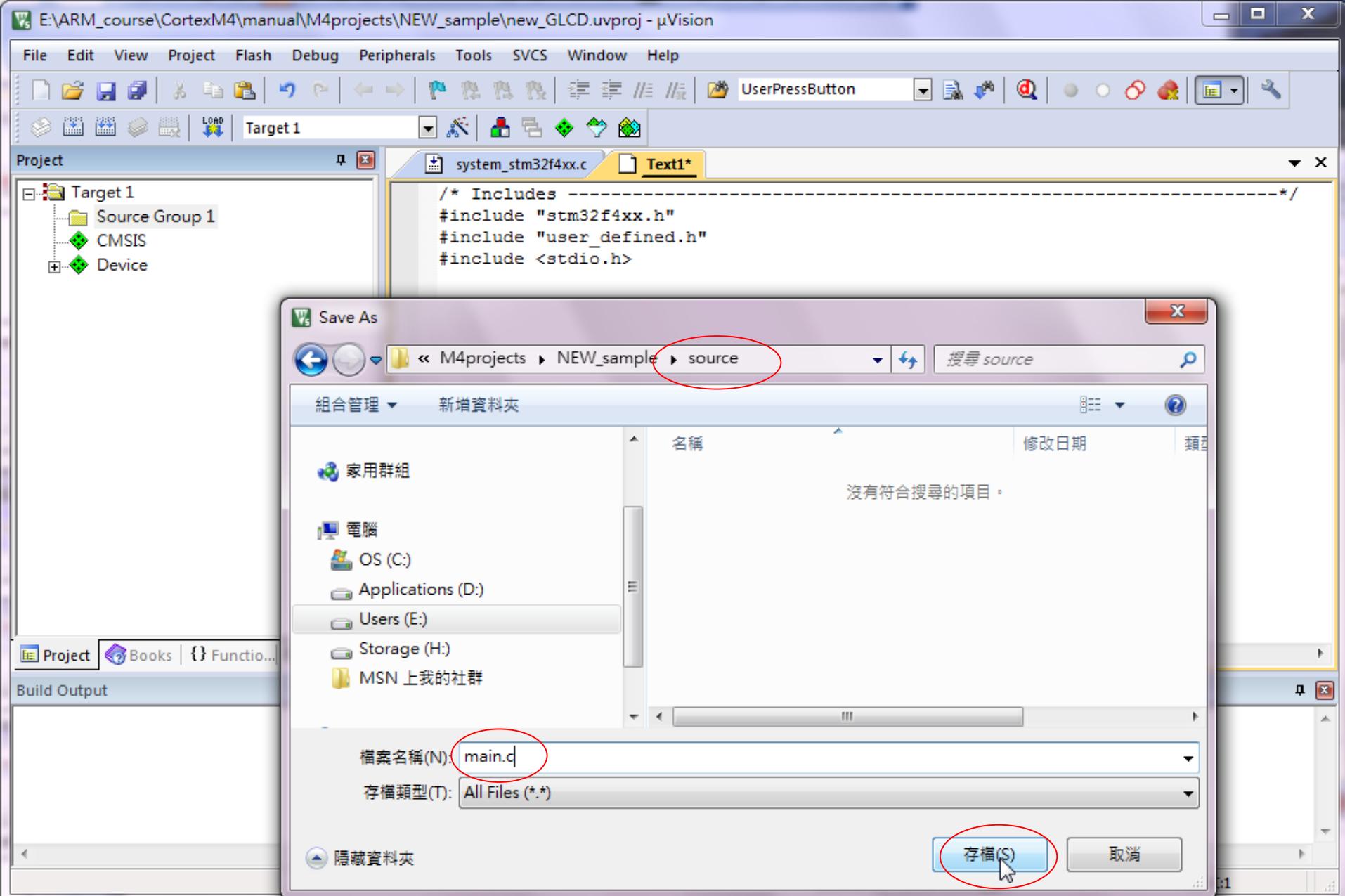


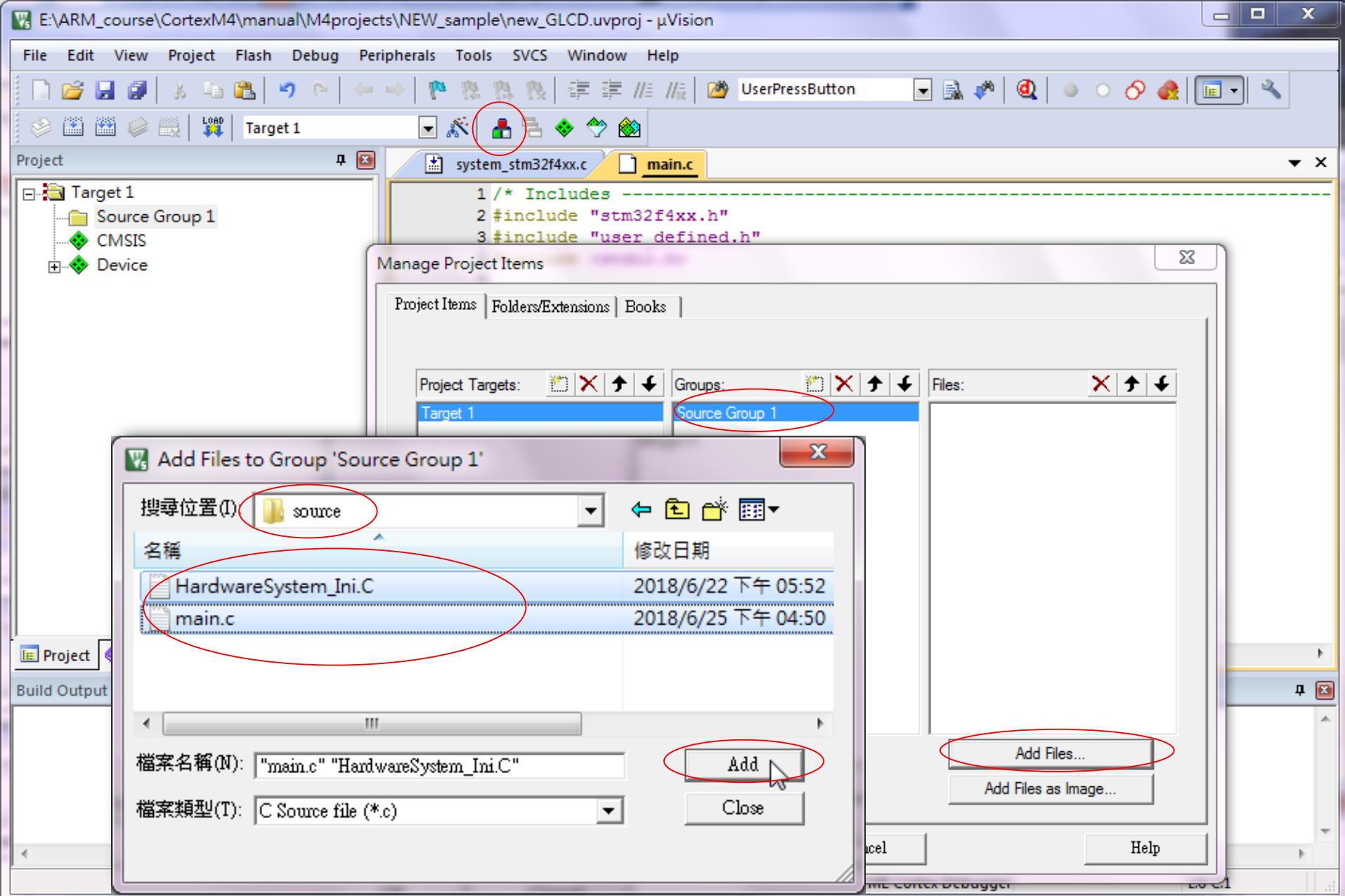


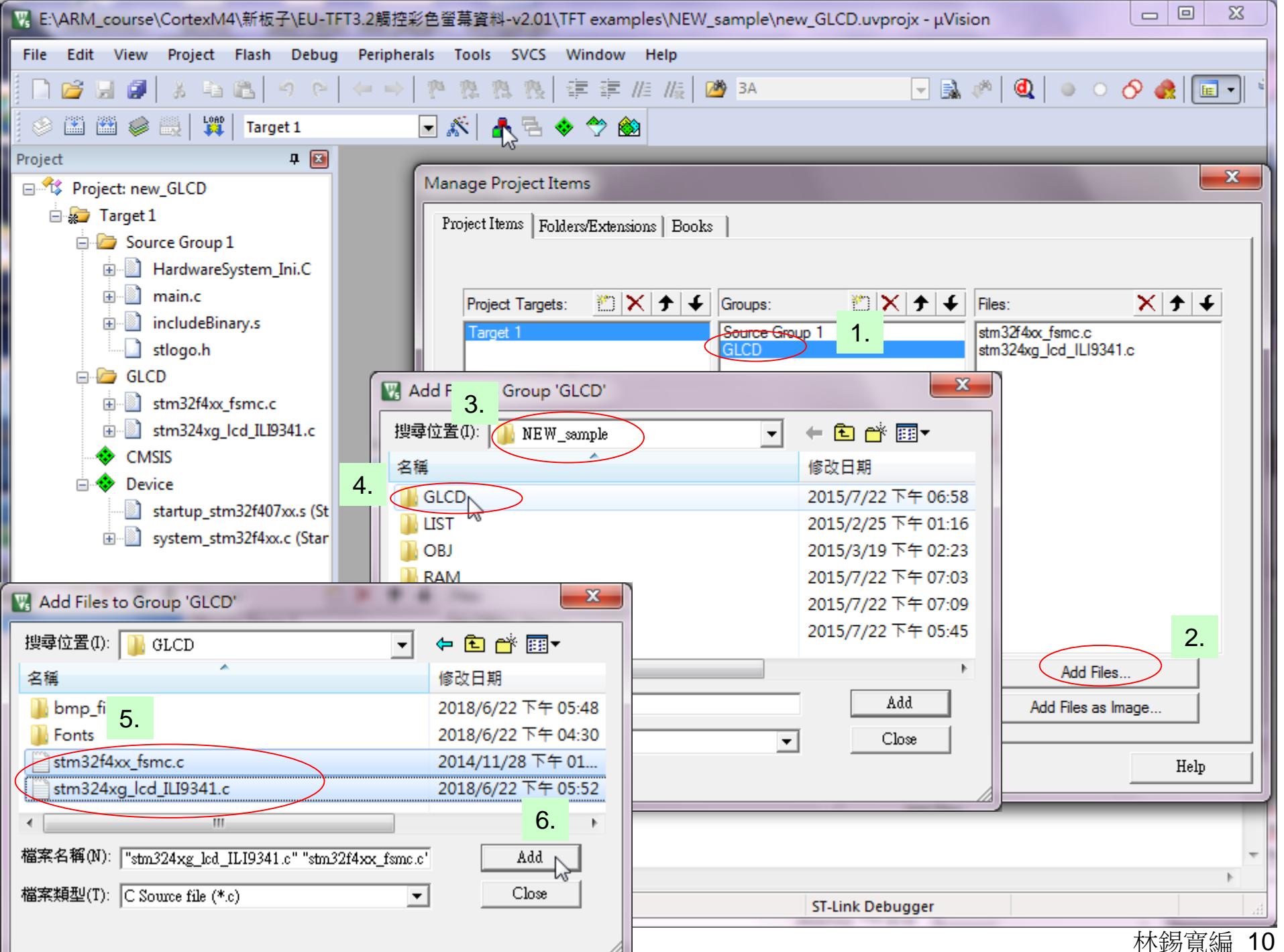


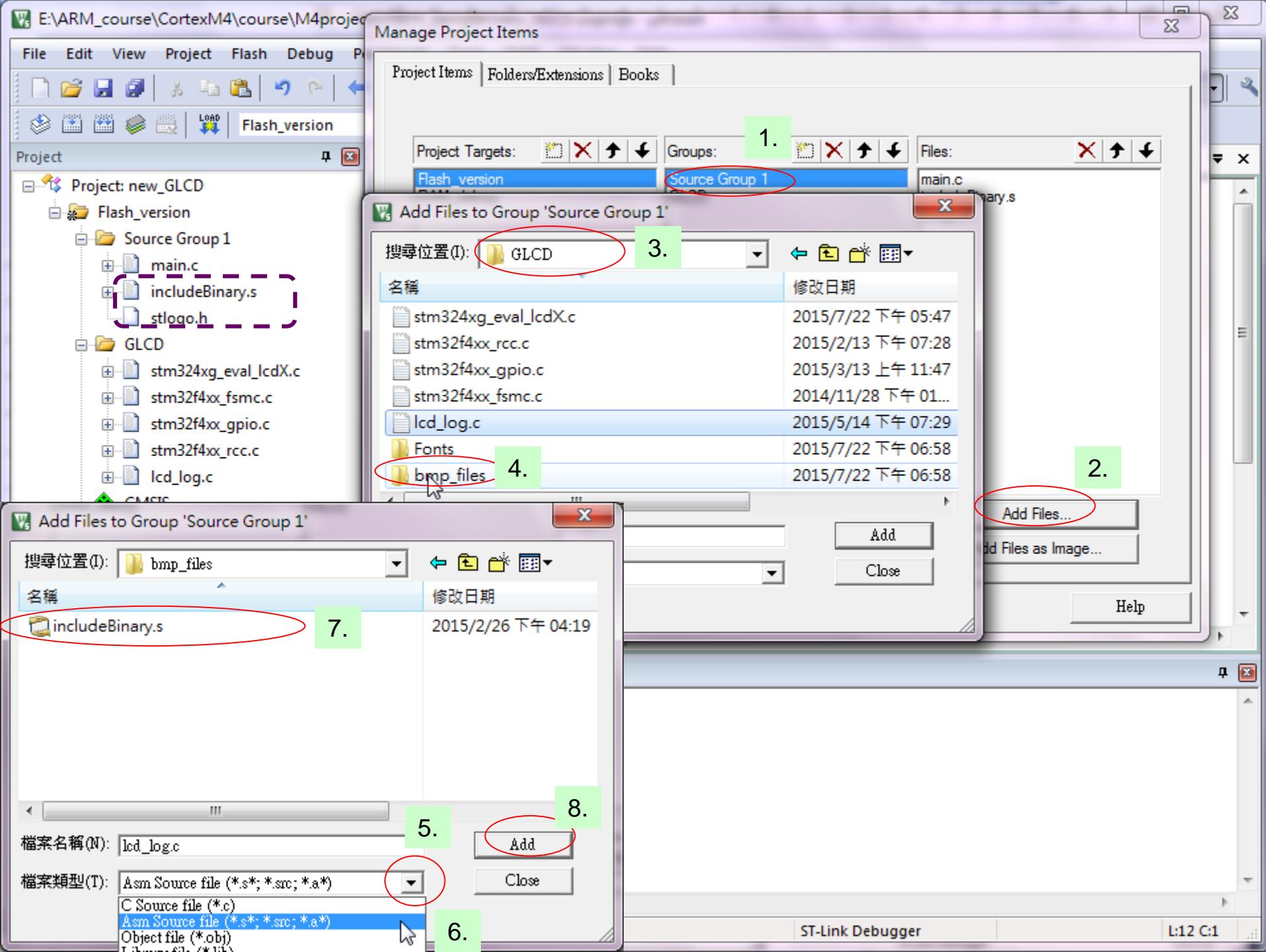


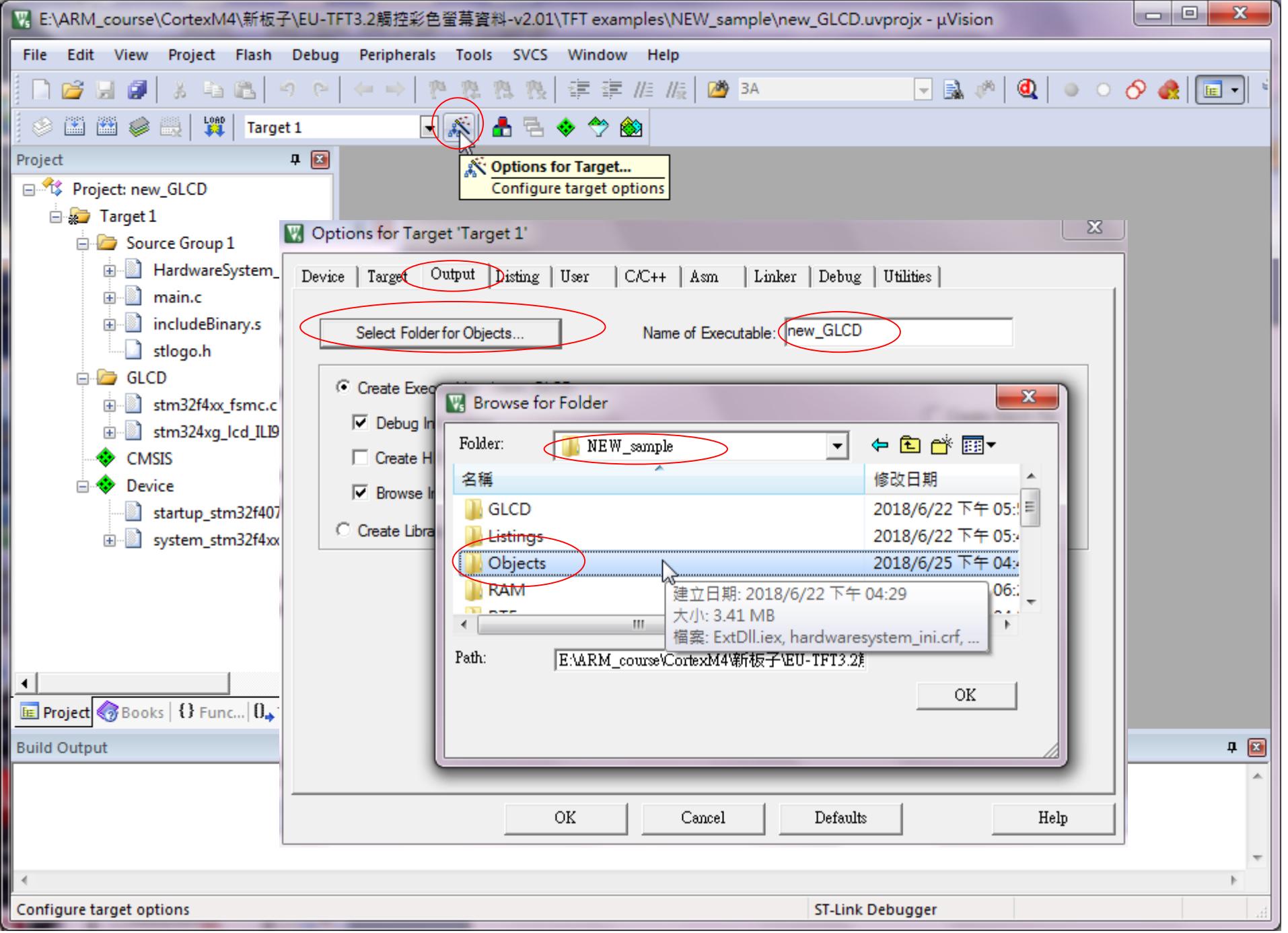


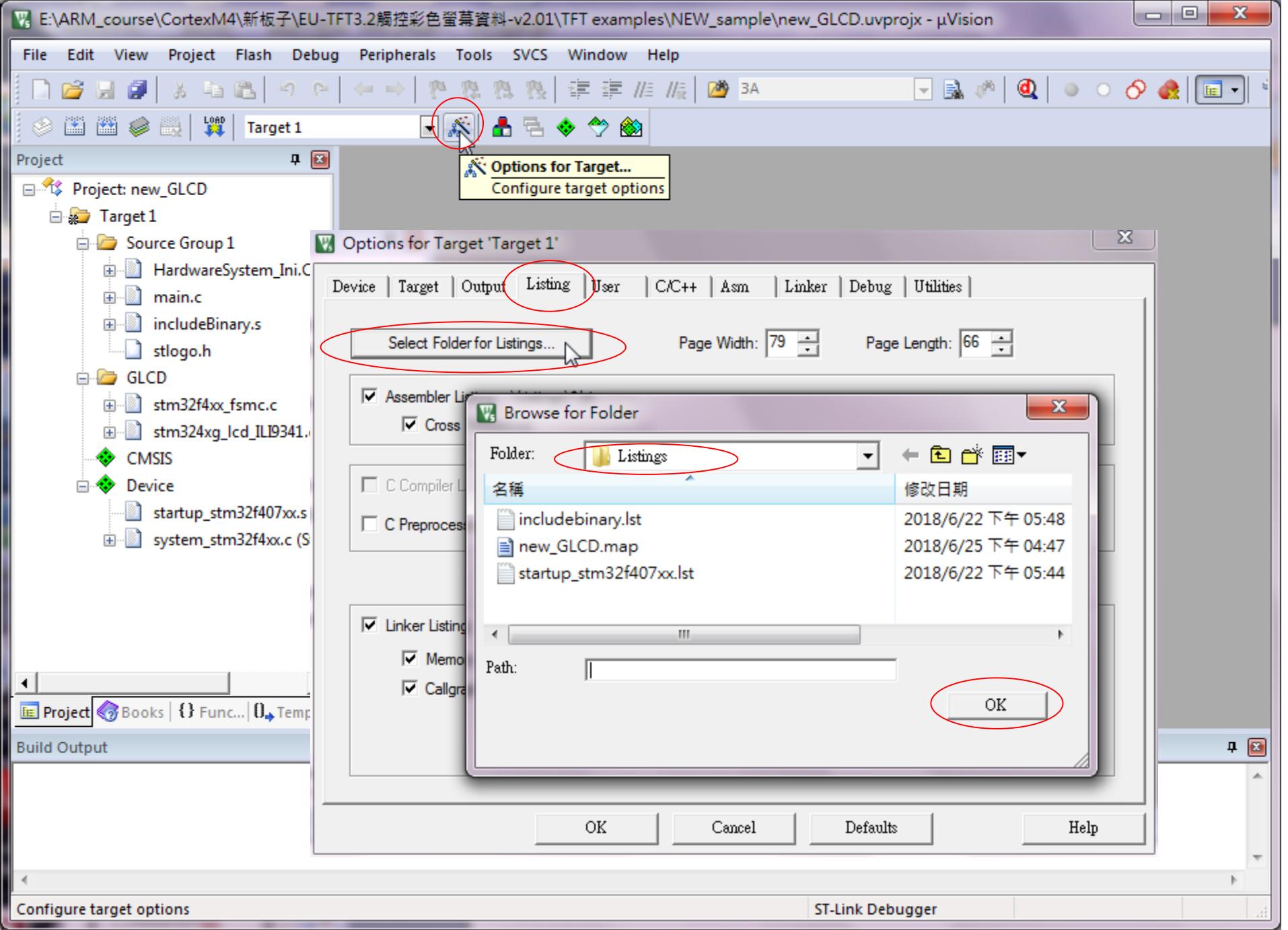


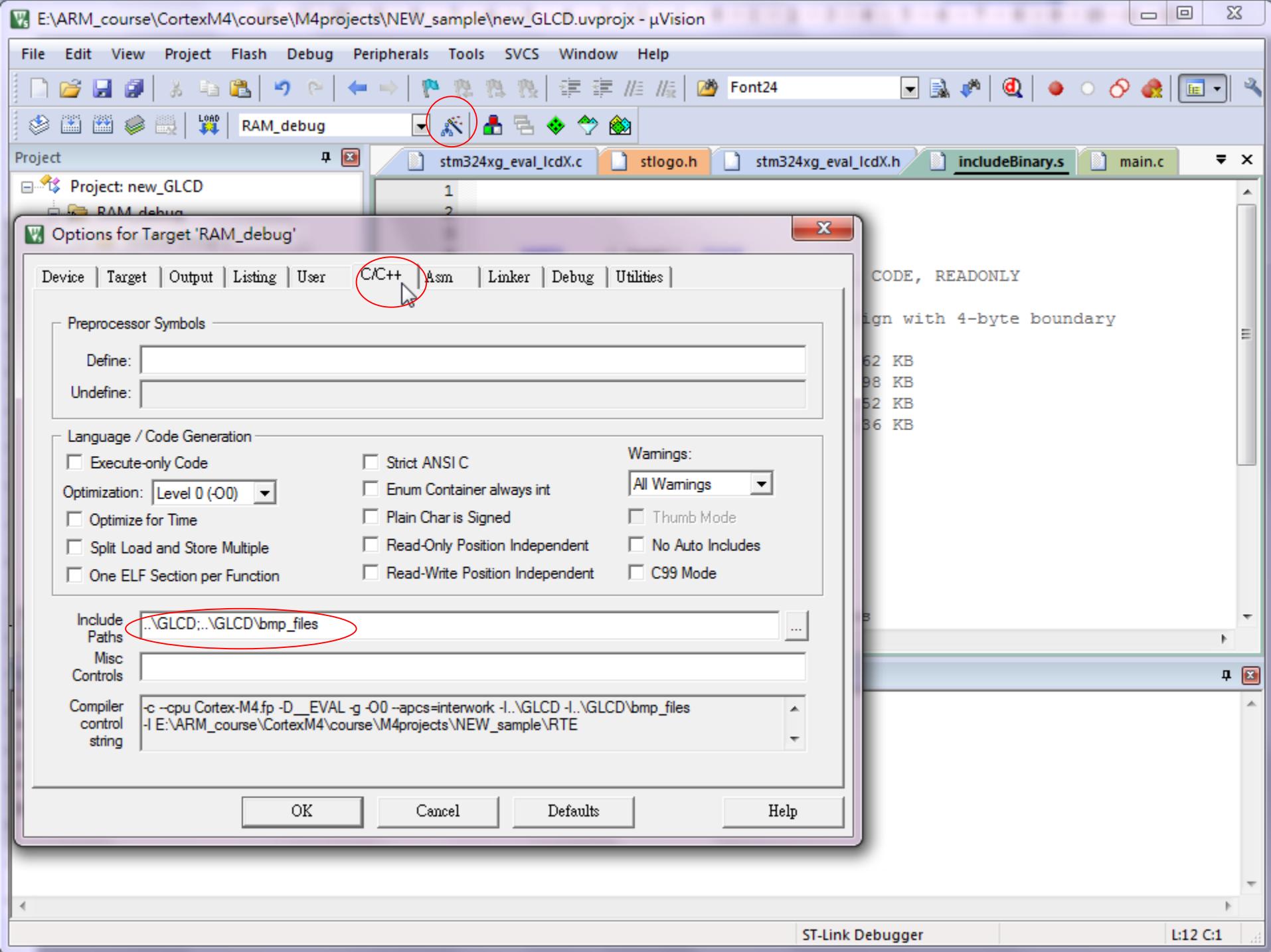


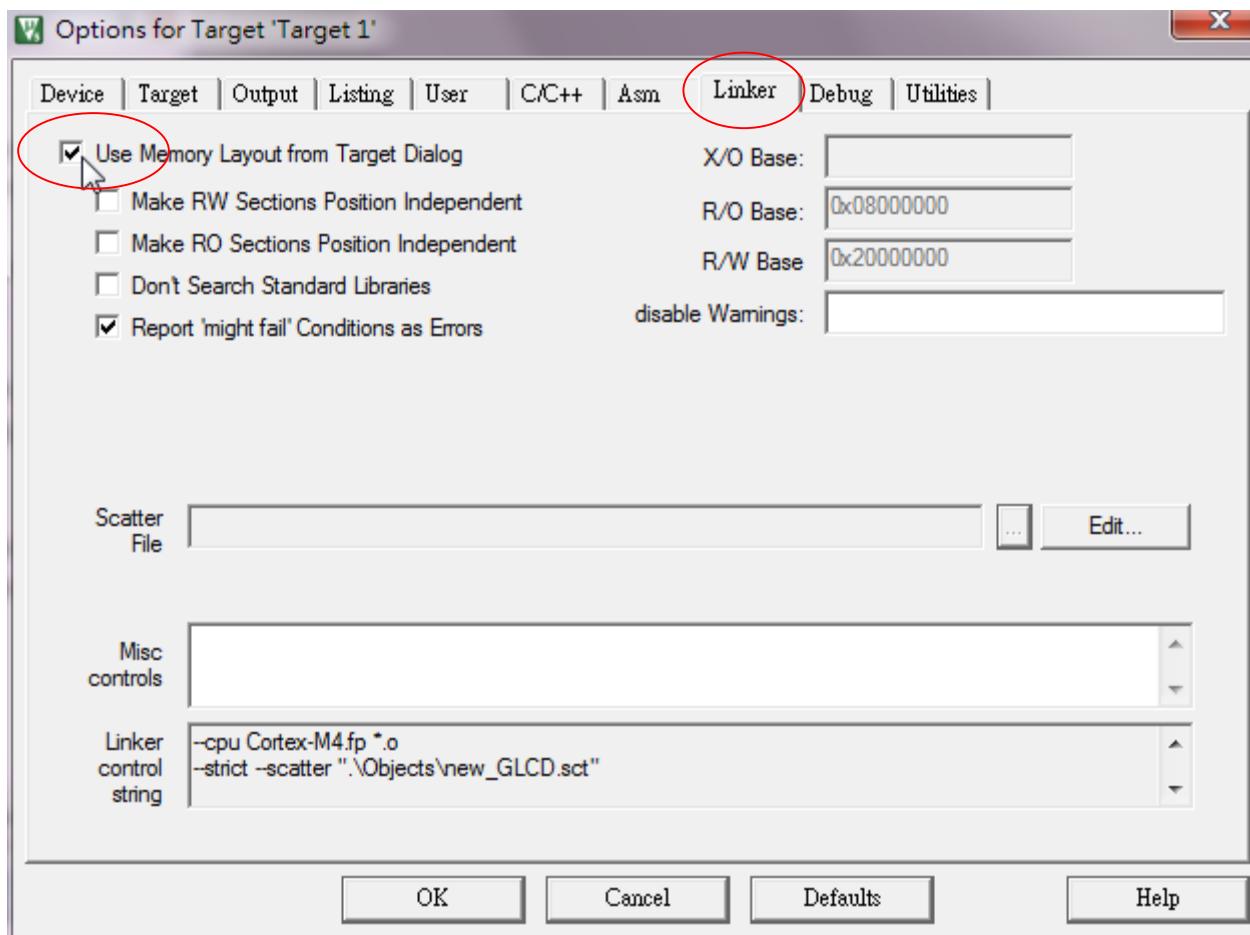


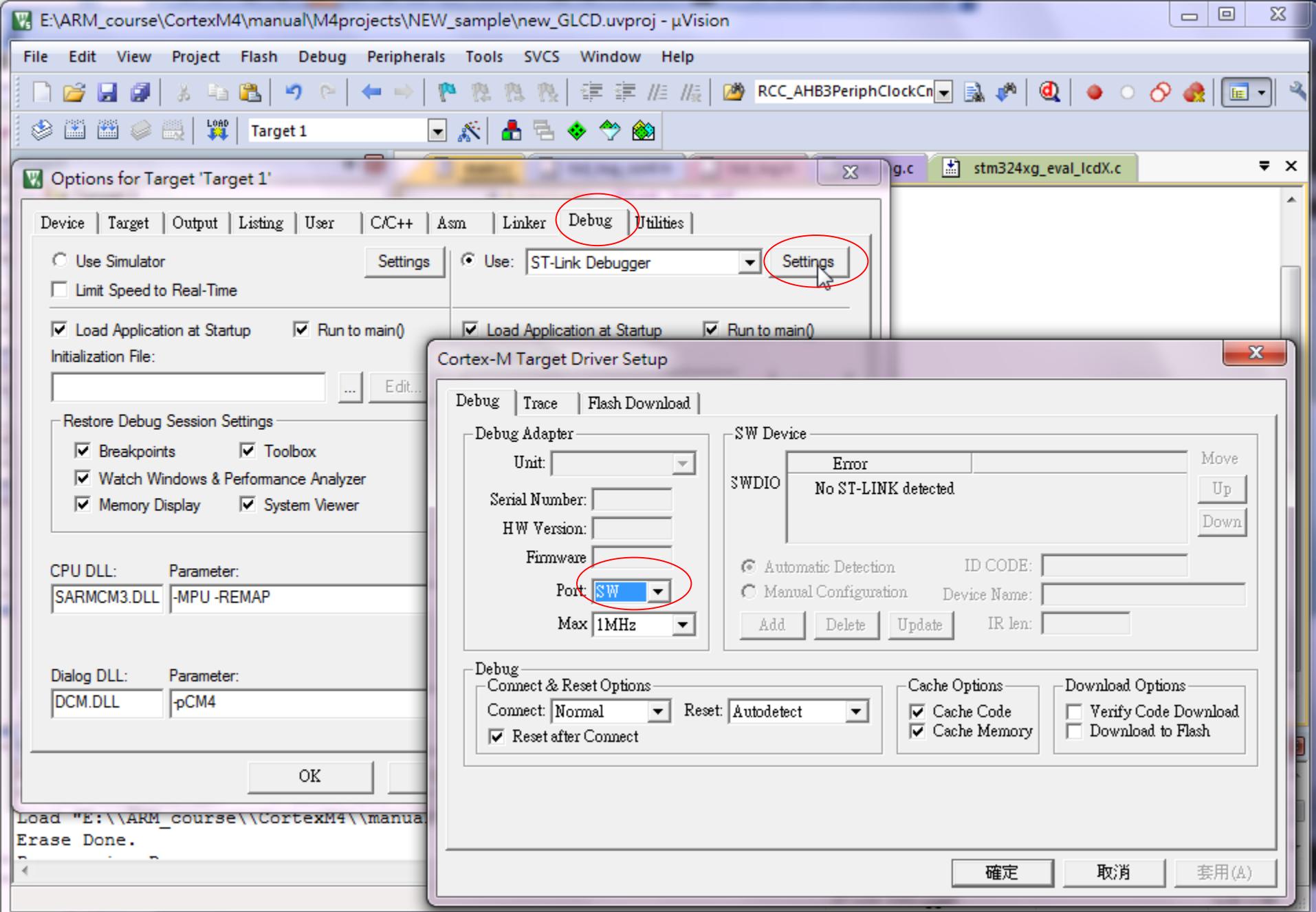


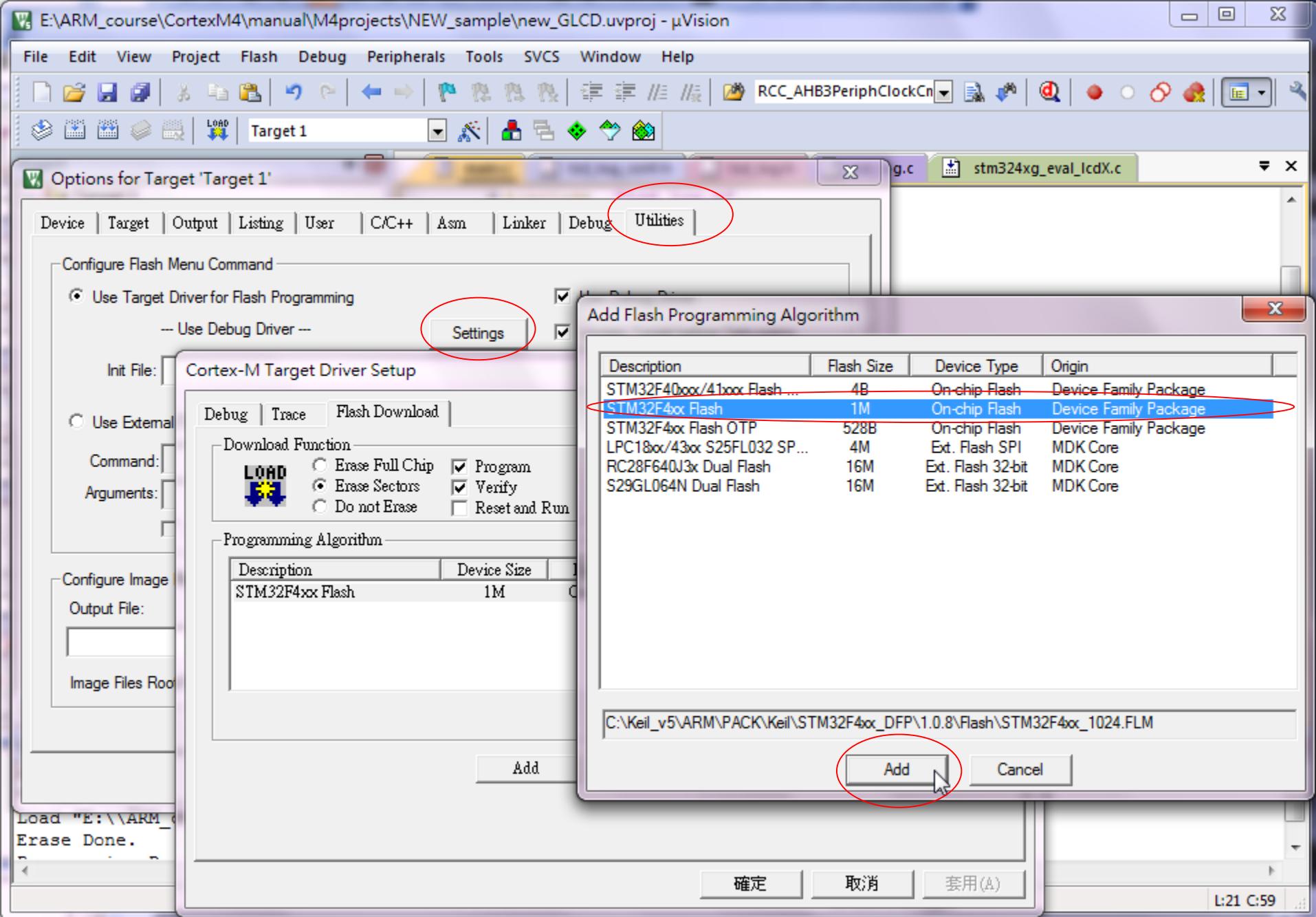












E:\ARM_course\CortexM4\新板子\EU-TFT3.2觸控彩色螢幕資料-v2.01\TFT examples\NEW_sample\new_GLCD.uvprojx - μVision

File Edit View Project Flash Debug Peripherals Tools SVCS Window Help

Project Target 1

HardwareSystem_Ini.C main.c

```
1 #include "stm32f4xx.h"
2 void STM32F4_Hardware_Init(void);
3 //>>>#####
4 #if !defined (HSI_VALUE)
5 #define HSI_VALUE ((uint32_t)16000000)
6 #endif /* HSI_VALUE */
7 //<<<<<#####
8
9 uint32_t SYS_Freq, HCLK_Freq, PCLK1_Freq;
10
11 void SystemInit(void) // be called at startup
12 {
13     #if (__FPU_PRESENT == 1) && (__FPU_PRESENT != __FPU_PRESENT)
14         SCB->CPACR |= ((3UL << 10*2) | (3UL << 12));
15     #endif
16 }
17
18 //----- <<< Use Configuration Wizard
19 //
20
21 /**
22 *          (#) For the STM32F405xx/07xx
23 *          frequency of the SYSTCR

```

Split Window horizontally

Insert '#include file' 1.os

Go to Headerfile

Insert/Remove Breakpoint F9

Enable/Disable Breakpoint Ctrl+F9

Insert/Remove Bookmark Ctrl+F2

Undo Ctrl+Z

Redo Ctrl+Y

Cut Ctrl+X

Copy Ctrl+C

Paste Ctrl+V

Select All Ctrl+A

Outlining

Advanced

Text Editor Configuration Wizard

Build Output

linking...

Program Size: Code=9946 RO-data=21378 RW-data=76 ZI-data=1636

".\Objects\new_GLCD.axf" - 0 Error(s), 0 Warning(s).

Build Time Elapsed: 00:00:02

Copy the selection to the clipboard ST-Link Debugger L3 C1

E:\ARM_course\CortexM4\新板子\EU-TFT3.2觸控彩色螢幕資料-v2.01\TFT examples\NEW_sample\new_GLCD.uvprojx - μVision

File Edit View Project Flash Debug Peripherals Tools SVCS Window Help

Project Target 1

HardwareSystem_Ini.C main.c*

```
1 /* Includes */
2 #include "stm32f4xx.h"
3 #include "stm324xg_lcd_sklin.h"
4 #include "stlogo.h"
5 #include <stdio.h>
6
7
8
9
10
11
12
13
14
15
16
17
18
19
20
21
22
23
24
```

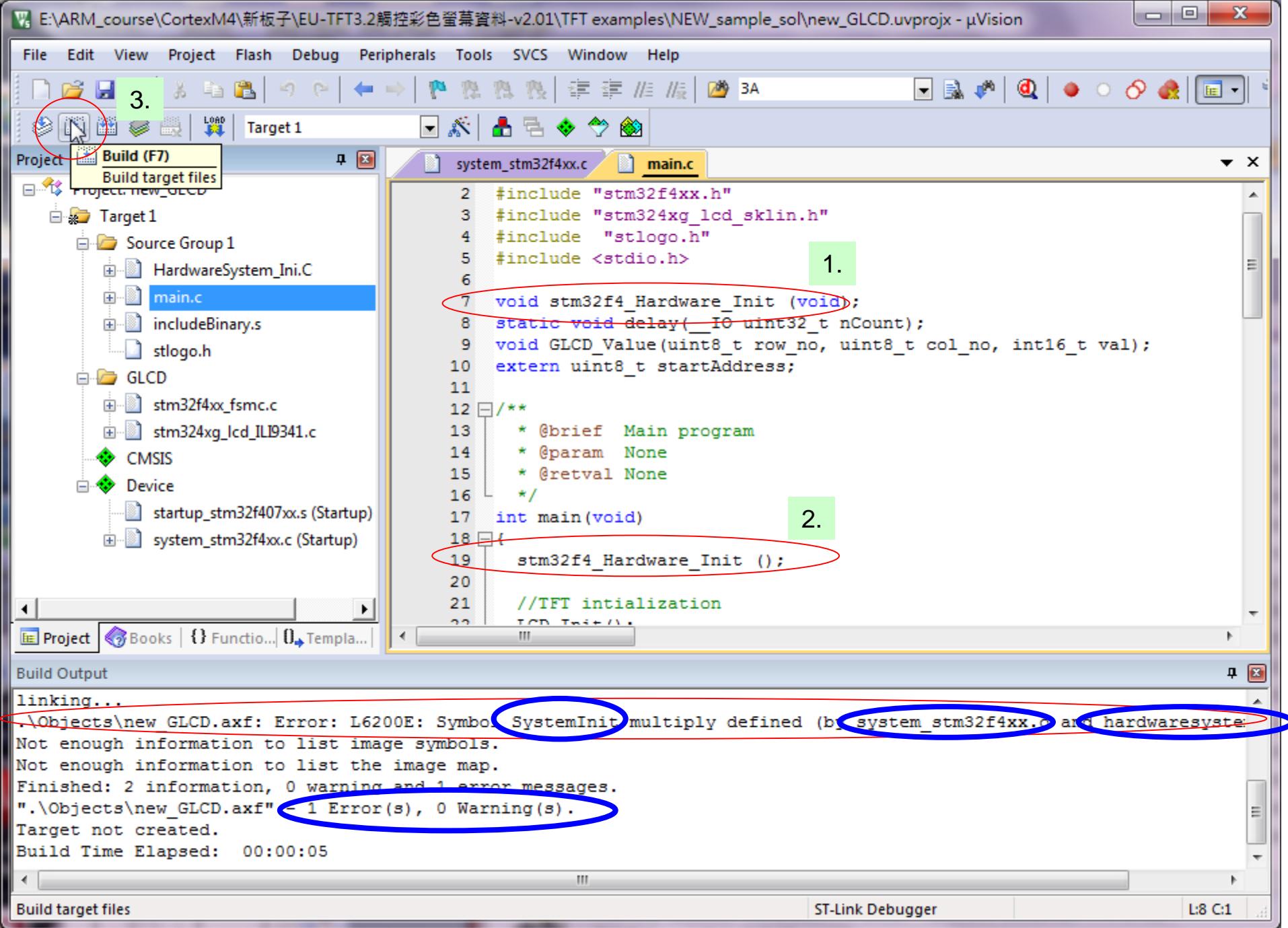
Split Window horizontally
Insert '#include file'
Go to Headerfile
Insert/Remove Breakpoint F9
Enable/Disable Breakpoint Ctrl+F9
Insert/Remove Bookmark Ctrl+F2
Undo Ctrl+Z
Redo Ctrl+Y
Cut Ctrl+X
Copy Ctrl+C
Paste Ctrl+V
Select All Ctrl+A
Outlining
Advanced

hCount);
uint8_t col_no, int16_t val);

CD COLOR BLUE); // Text = red; back = blue

Project Books Func... Temp...
Build Output
linking...
Program Size: Code=9946 RO-data=21378 RW-data=76 ZI-data=1636
".\Objects\new_GLCD.axf" - 0 Error(s), 0 Warning(s).
Build Time Elapsed: 00:00:02

Insert clipboard contents ST-Link Debugger L7 C1



E:\ARM_course\CortexM4\新板子\EU-TFT3.2觸控彩色螢幕資料-v2.01\TFT examples\NEW_sample_sol\new_GLCD.uvprojx - μVision

File Edit View Project Flash Debug Peripherals Tools SVCS Window Help

Project Target 1

Project: new_GLCD

Target 1

Source Group 1

- HardwareSystem_Ini.C
- main.c
- includeBinary.s
- stlogo.h

GLCD

- stm32f4xx_fsmc.c
- stm324xg_lcd_LL19341.c

CMSIS

Device

- startup_stm32f407xx.s (Startup)
- system_stm32f4xx.c (Startup)

system_stm32f4xx.c*

main.c

```
154
155 /**
156 * @}
157 */
158
159 /**
160 * @addtogroup STM32F4xx_System_Private_Functions
161 * @{
162 */
163 /**
164 * @brief Setup the microcontroller system
165 * Initialize the FPU setting, vector table location and Ext
166 * configuration.
167 * @param None
168 * @retval None
169 */
170 weak void SystemInit(void)
171 {
172     /* FPU settings
173     #if (_FPU_PRESENT == 1)
174         /* set CP10 and CP11 */

Insert: "__weak"
```

Build Output

```
new_GLCD.axf: Error: L6200E: Symbol SystemInit multiply defined (by system_stm32f4xx.o and hardwareSystem_ini.o)
```

Information to list image symbols.

Information to list the image map.

2 information, 0 warning and 1 error messages.

"\new_GLCD.axf" - 1 Error(s), 0 Warning(s).

Elapsed: 00:00:05

ST-Link Debugger

L170 C8

E:\ARM_course\CortexM4\新板子\EU-TFT3.2觸控彩色螢幕資料-v2.01\TFT examples\NEW_sample_sol\new_GLCD.uvprojx - μVision

File Edit View Project Flash Debug Peripherals Tools SVCS Window Help

Project Build (F7) Target 1

Build target files

Target 1

Source Group 1

- HardwareSystem_Ini.C
- main.c
- includeBinary.s
- stlogo.h

GLCD

- stm32f4xx_fsmc.c
- stm324xg_lcd_ILI9341.c

CMSIS

Device

- startup_stm32f407xx.s (Startup)
- system_stm32f4xx.c (Startup)

system_stm32f4xx.c main.c

```
154
155 /**
156 * @}
157 */
158
159 /**
160 * @addtogroup STM32F4xx_System_Private_Functions
161 * @{
162 */
163 /**
164 * @brief Setup the microcontroller system
165 * Initialize the FPU setting, vector table location and Ext
166 * configuration.
167 * @param None
168 * @retval None
169 */
170 __weak void SystemInit(void)
171 {
172     /* FPU settings -----
173     #if (_FPU_PRESENT == 1) && (_FPU_USED == 1)
174         SCR = CDPACR |= ((2^11) << 10*2^11/2^11) | 11*2^11; /* set CP10 and CP11
175     
```

Books Functions Templates

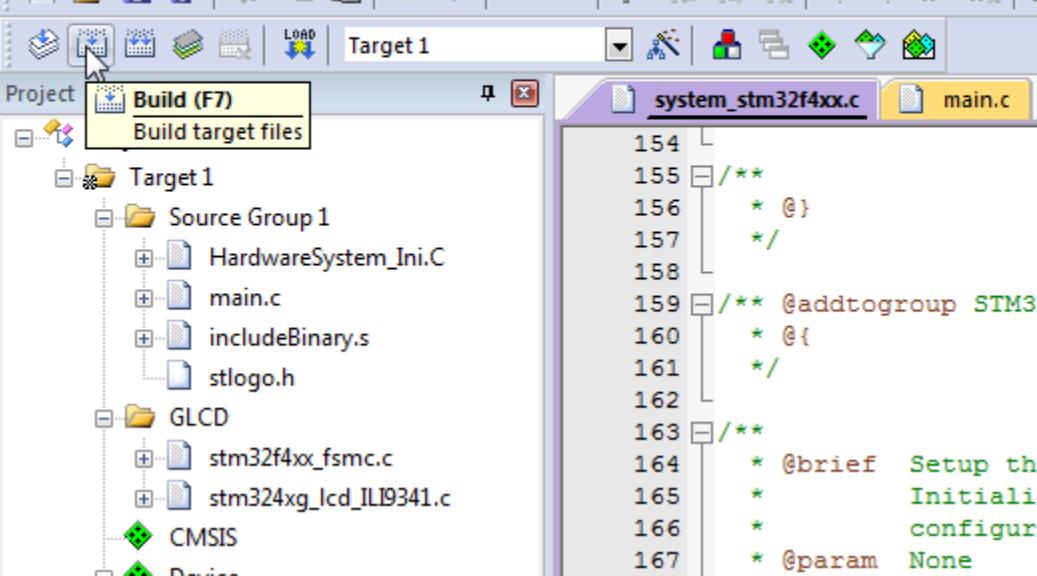
Build Output

```
Build target 'Target 1'
compiling system_stm32f4xx.c...
linking...
Program Size: Code=9946 RO-data=21378 RW-data=76 ZI-data=1636
".\Objects\new_GLCD.axf" - 0 Error(s), 0 Warning(s).
Build Time Elapsed: 00:00:01
```

Build target files

ST-Link Debugger

L169 C1



PG12 [FSMC_NE4]	◇DIS1	1-CS	2-RS	◇DIS2	PG0 [FSMC_A10]
PD5 [FSMC_NWE]	◇DIS3	3-WR	4-RD	◇DIS4	PD4 [FSMC_NOE]
PC5	◇DIS5	5-RST	6-DB0	◇DIS6	PD14 [FSMC_D0]
PD15 [FSMC_D1]	◇DIS7	7-DB1	8-DB2	◇DIS8	PD0 [FSMC_D2]
PD1 [FSMC_D3]	◇DIS9	9-DB3	10-DB4	◇DIS10	PE7 [FSMC_D4]
PE8 [FSMC_D5]	◇DIS11	11-DB5	12-DB6	◇DIS12	PE9 [FSMC_D6]
PE10 [FSMC_D7]	◇DIS13	13-DB7	14-DB8	◇DIS14	PE11 [FSMC_D8]
PE12 [FSMC_D9]	◇DIS15	15-DB9	16-DB10	◇DIS16	PE13 [FSMC_D10]
PE14 [FSMC_D11]	◇DIS17	17-DB11	18-DB12	◇DIS18	PE15 [FSMC_D12]
PD8 [FSMC_D13]	◇DIS19	19-DB13	20-DB14	◇DIS20	PD9 [FSMC_D14]
PD10 [FSMC_D15]	◇DIS21	21-DB15	22-*SDCS	◇DIS22	PC2
PB0	◇DIS23	23-LIG	24-VDD	3.3V	
		25-VDD	26-GND	GND	
		27-GND	28-NC	NC	
PF8	◇DISA	29-MISO	30-MOSI	◇DISB	PF9
PF10	◇DISC	31-TINT	32-*FCS	◇DISD	PC3
PB2	◇DISE	33-TCS	34-SCK	◇DISF	PB1

E:\ARM_course\CortexM4\新板子\EU-TFT3.2觸控彩色螢幕資料-v2.01\TFT examples\NEW_sample\new_GLCD.uvprojx - μVision

File Edit View Project Flash Debug Peripherals Tools SVCS Window Help

Project Target 1

stm324xg_lcd_ILI9341.c HardwareSystem_Ini.C main.c

```
331 void LCD_Init(void)
332 {
333     //-- LCD PORT INIT --
334     // LCD_PortInit();
335     GPIO_backlight = GPIO_outPPhigh(PNr_backlight, PIN_bl); // backlight pin
336     GPIO_reset = GPIO_outPPhigh(PNr_reset, PIN_rs); // reset pin
337     GPIO_AF12PPhigh(PNr_FSMC_set1, PinBit_FSMC_set1);
338     GPIO_AF12PPhigh(PNr_FSMC_set2, PinBit_FSMC_set2);
339     GPIO_AF12PPhigh(PNr_FSMC_set3, PinBit_FSMC_set3);
340     /* GPIOD: AF_FSMC, Speed_100MHz , push pull, no pull-up or pull-down
341      -----
342      | Pin: PD | 0 1 4 5 8 9 10 14 15
343      | GLCD | D2 D3 (RD) (WR) D13 D14 D15 D0 D1
344      -----
345      GPIOE: AF_FSMC, Speed_100MHz , push pull, no pull-up or pull-down
346      -----
347      | Pin: PE | 7 8 9 10 11 12 13 14 15
348      | GLCD | D4 D5 D6 D7 D8 D9 D10 D11 D12
349      -----
350      GPIOG: AF_FSMC, Speed_100MHz , push pull, no pull-up or pull-down
351      -----
352      | Pin : PG | 0 12
353      | GLCD | (RS) (CS)
354      (FSMC_A10) (FSMC_NE4)
355      -----
356 */
357
358
```

Project Books Func... Temp...

Build Output

linking...

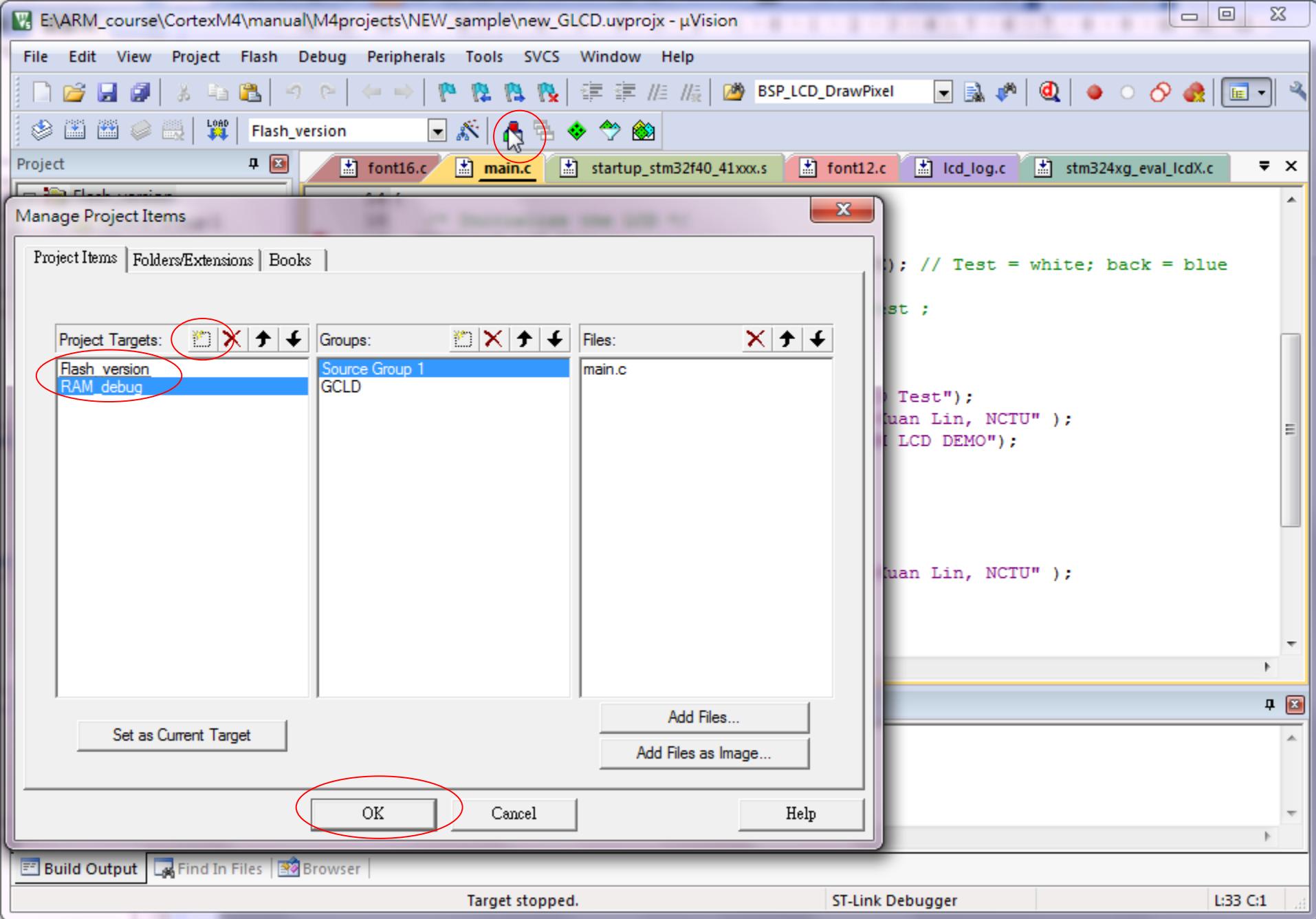
ST-Link Debugger

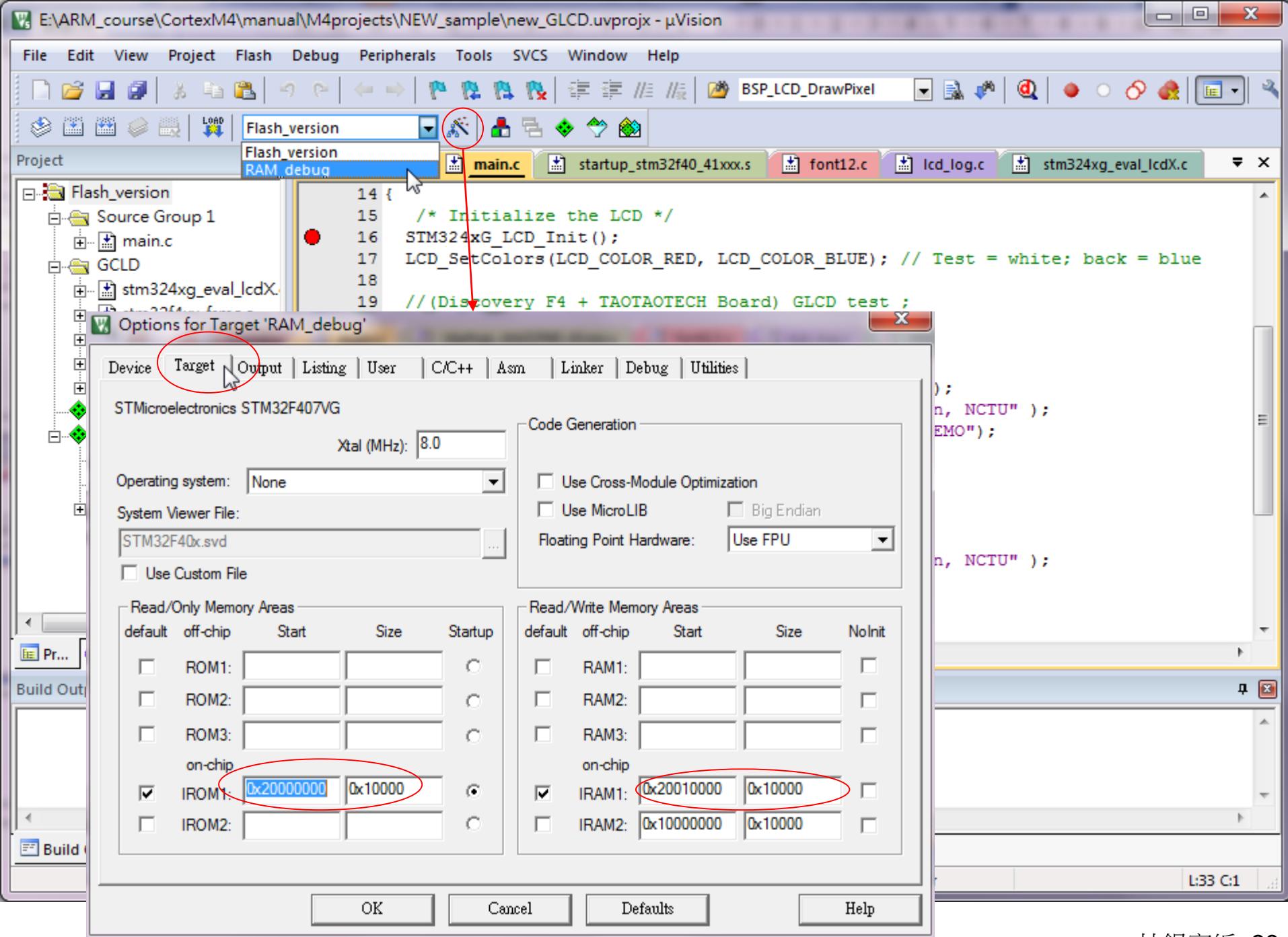
L1 C1

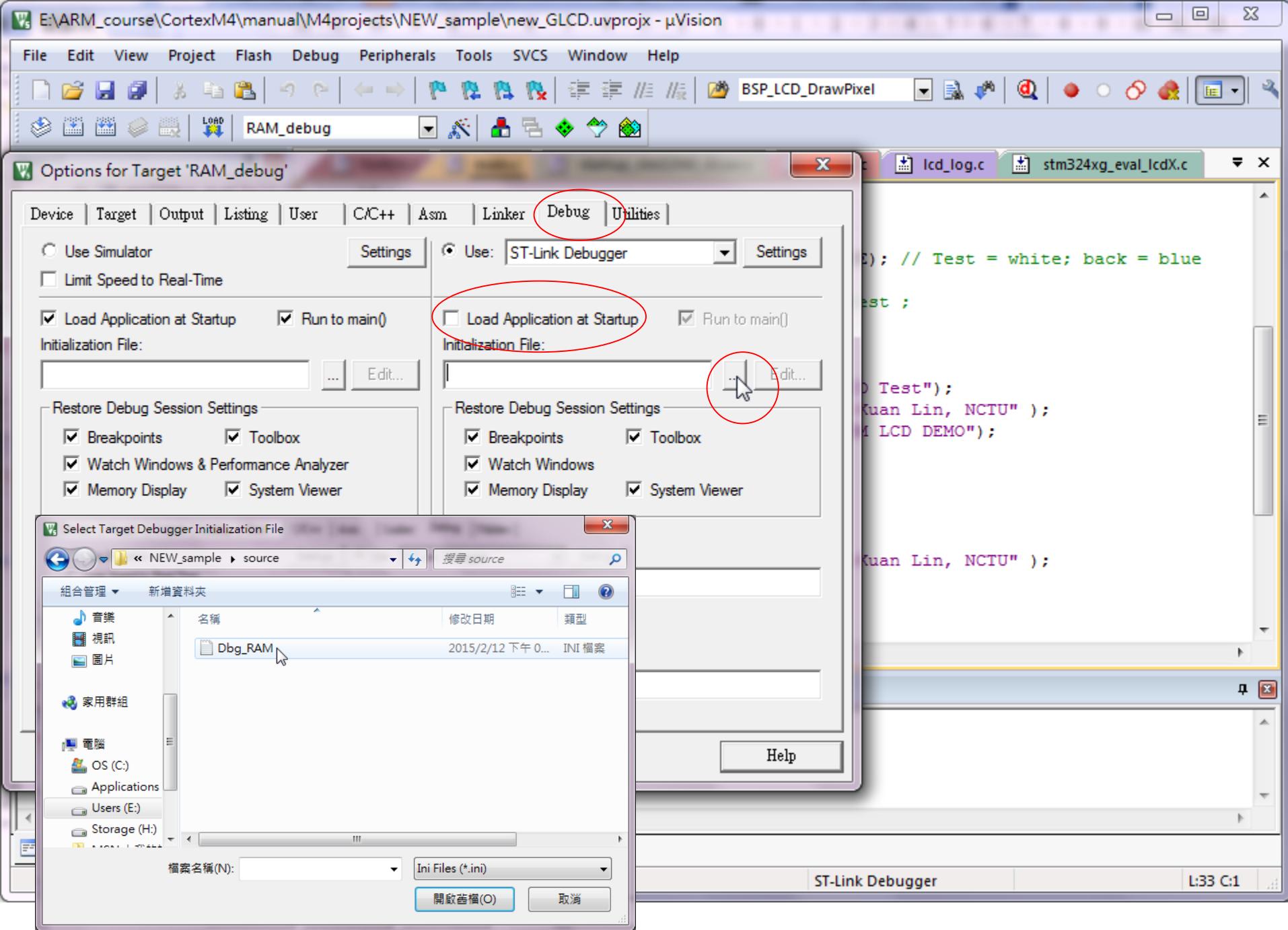
AF_FSMC, Speed_100MHz , push pull, no pull-up or pull-down

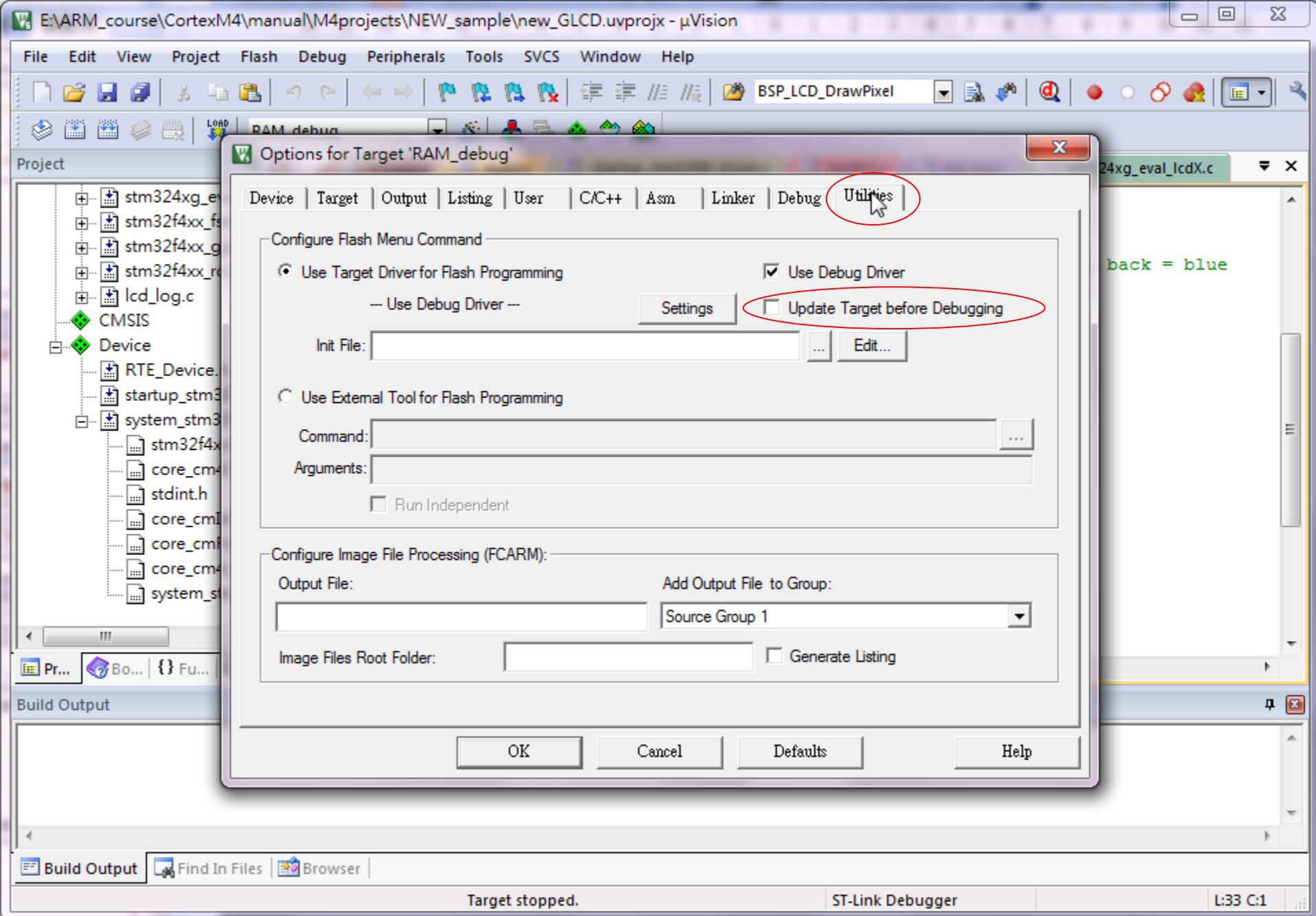
序号	EU-TFT3.2 彩屏模块	STM32F103ZE/ STM32F407ZG	STM32F407VE	STM8S207R8	备注
1	CS	PG12	PD7	PE7	
2	RS	PG0	PD13	PE6	
3	WR	PD5	PD5	PA6	
4	RD	PD4	PD4	PE5	
5	RST	PC5	PC5	PIO	
6	DB0	PD14	PD14	PB0	
7	DB1	PD15	PD15	PB1	
8	DB2	PD0	PD0	PB2	
9	DB3	PD1	PD1	PB3	
10	DB4	PE7	PE7	PB4	
11	DB5	PE8	PE8	PB5	
12	DB6	PE9	PE9	PB6	
13	DB7	PE10	PE10	PB7	
14	DB8	PE11	PE11	PG0	
15	DB9	PE12	PE12	PG1	
16	DB10	PE13	PE13	PG2	
17	DB11	PE14	PE14	PG3	
18	DB12	PE15	PE15	PG4	
19	DB13	PD8	PD8	PG5	
20	DB14	PD9	PD9	PG6	
21	DB15	PD10	PD10	PG7	
22	NC	NC	NC	NC	
23	LIG	PB0	PB0	PA3	
24	VDD	3.3V	3.3V	3.3V	

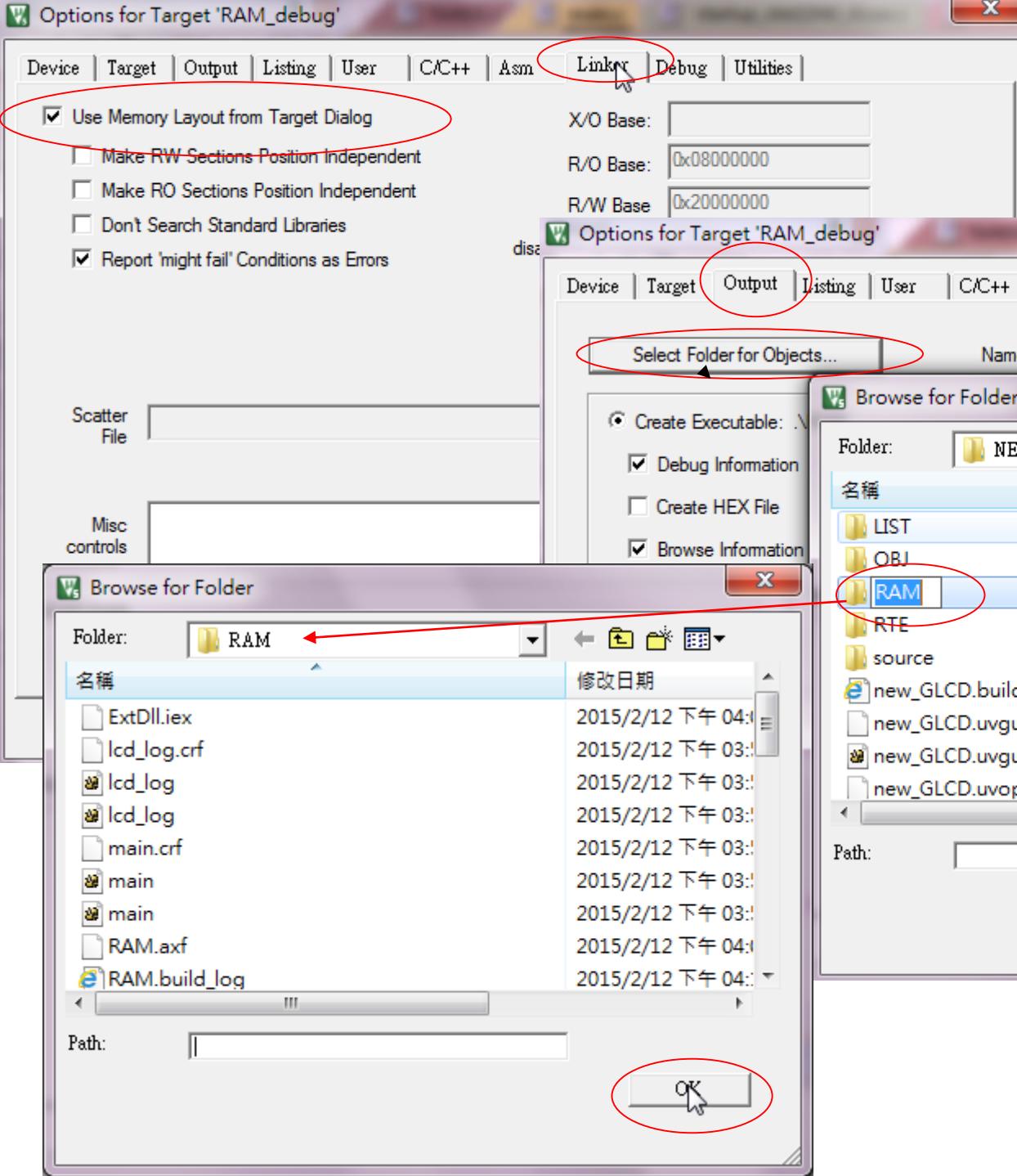
RAM_Debug

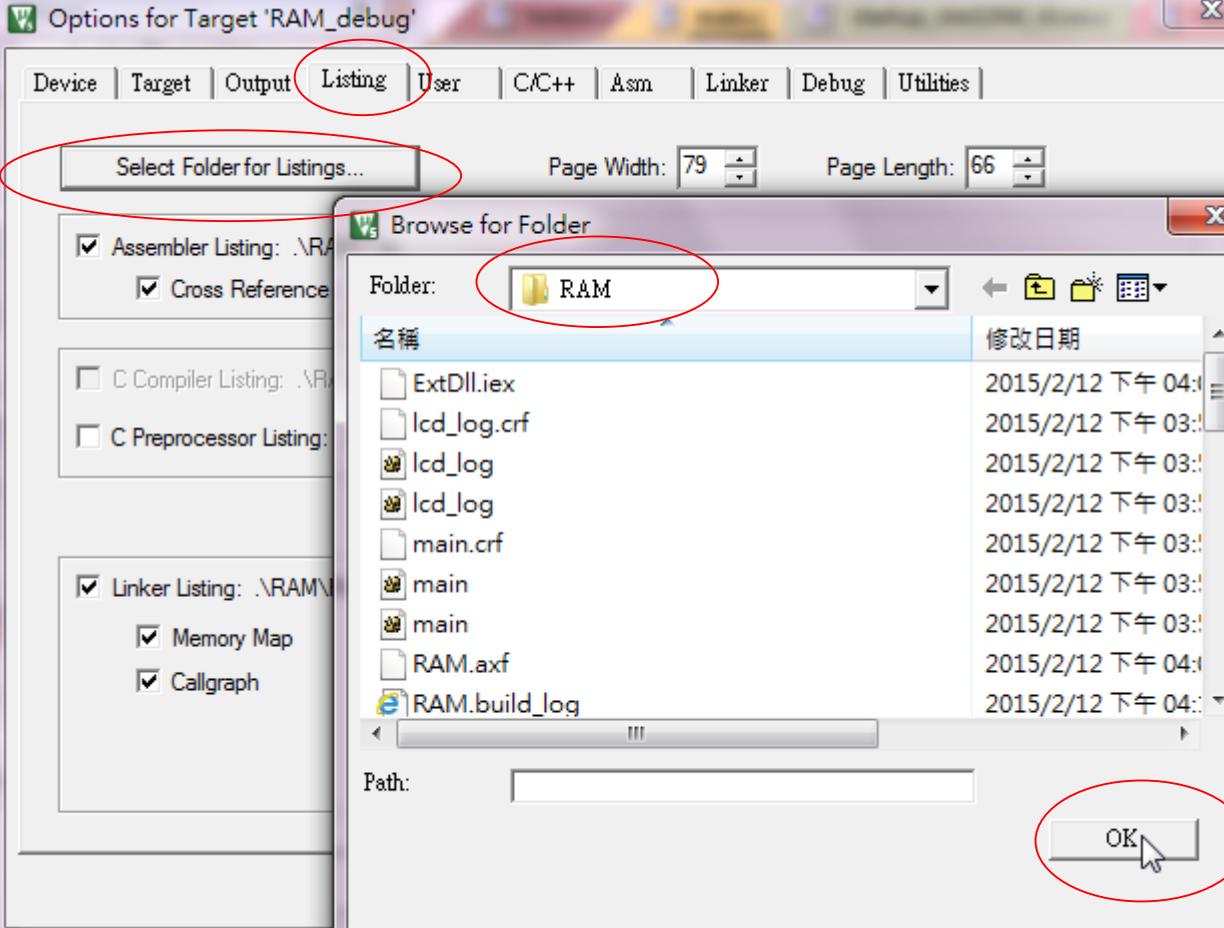


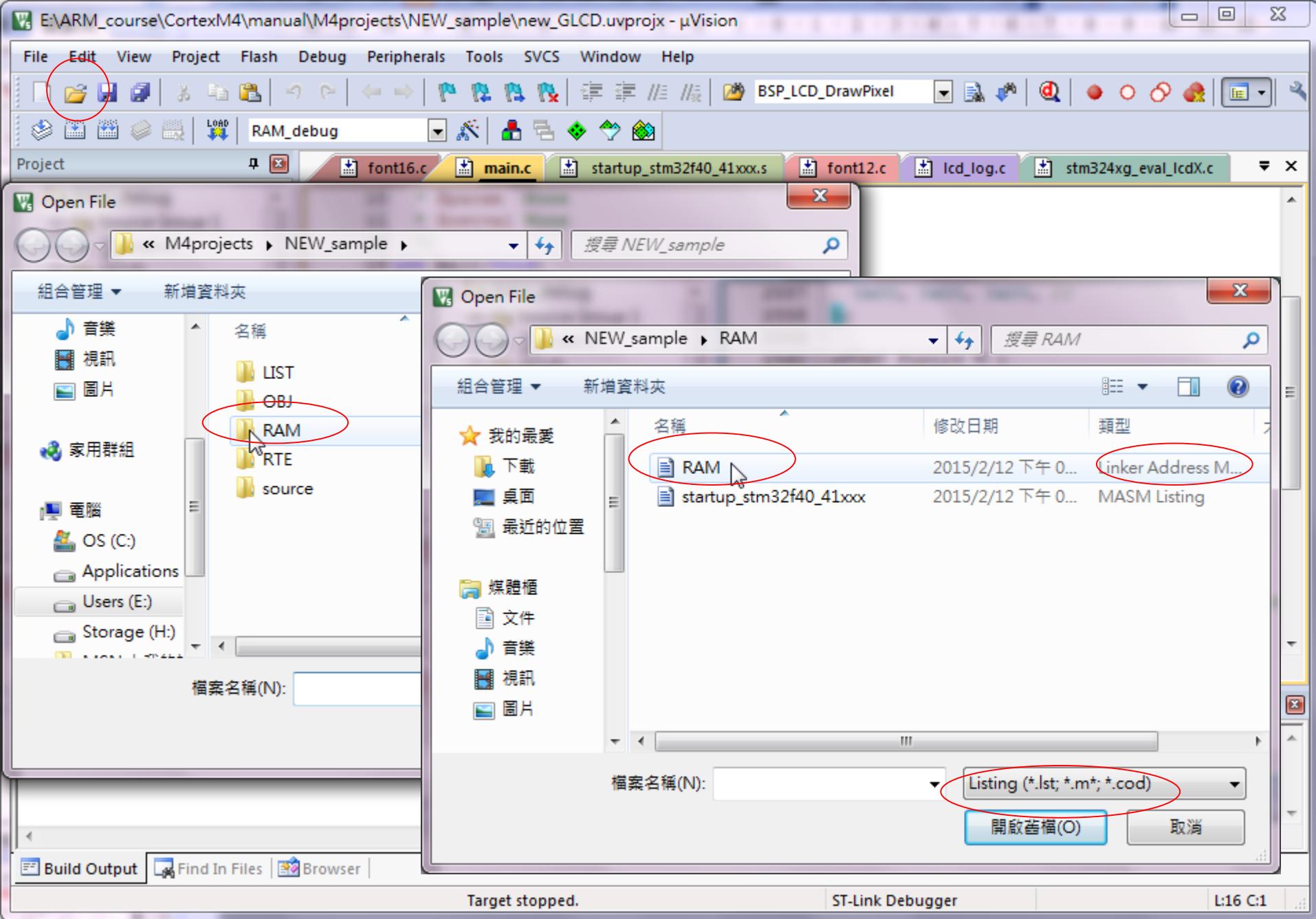












E:\ARM_course\CortexM4\manual\M4projects\NEW_sample\new_GLCD.uvprojx - μVision

File Edit View Project Flash Debug Peripherals Tools SVCS Window Help

Project RAM_debug RAM.map font24.c font16.c main.c startup_stm32f40_41xxx.s font12.c lcd_log.c

RAM_debug
Source Group 1
main.c
GCLD
stm324xg_e
stm32f4xx_f
stm32f4xx_g
stm32f4xx_r
lcd_log.c
CMSIS
Device
RTE_Device.
startup_stm3
system_stm3
stm32f4x
core_cm4
stdint.h
core_cm4
core_cm4
core_cm4
system_s

Load Region LR_IROM1 (Base: 0x20000000, Size: 0x00007048, Max: 0x00010000, ABSOLUTE, COM
Execution Region ER_IROM1 (Base: 0x20000000, Size: 0x00006de8, Max: 0x00010000, ABSOLU

Base Addr	Size	Type	Attr	Idx	E	Section Name	Object
0x20000000	0x000000188	Data	RO	229		RESET	startup_stm32f
0x20000188	0x00000008	Code	RO	264	*	!!!main	c_w.l(__main.o)
0x20000190	0x00000034	Code	RO	435		!!!scatter	c_w.l(__scatte
0x200001c4	0x0000005a	Code	RO	433	!!	dczerorl2	c_w.l(__dczero
0x2000021e	0x00000002	PAD					
0x20000220	0x0000001c	Code	RO	437	!!	handler_zi	c_w.l(__scatte
0x2000023c	0x00000002	Code	RO	306	.	ARM.Collect\$\$libinit\$\$00000000	c
0x2000023e	0x00000004	Code	RO	312	.	ARM.Collect\$\$libinit\$\$00000001	c
0x20000242	0x00000000	Code	RO	316	.	ARM.Collect\$\$libinit\$\$00000008	c
0x20000242	0x00000000	Code	RO	318	.	ARM.Collect\$\$libinit\$\$0000000A	c
0x20000242	0x00000000	Code	RO	320	.	ARM.Collect\$\$libinit\$\$0000000C	c
0x20000242	0x00000000	Code	RO	323	.	ARM.Collect\$\$libinit\$\$0000000F	c
0x20000242	0x00000000	Code	RO	325	.	ARM.Collect\$\$libinit\$\$00000011	c
0x20000242	0x00000000	Code	RO	327	.	ARM.Collect\$\$libinit\$\$00000013	c
0x20000242	0x00000000	Code	RO	329	.	ARM.Collect\$\$libinit\$\$00000015	c
0x20000242	0x00000000	Code	RO	331	.	ARM.Collect\$\$libinit\$\$00000017	c
0x20000242	0x00000000	Code	RO	333	.	ARM.Collect\$\$libinit\$\$00000019	c
0x20000242	0x00000000	Code	RO	335	.	ARM.Collect\$\$libinit\$\$0000001B	c
0x20000242	0x00000000	Code	RO	337	.	ARM.Collect\$\$libinit\$\$0000001D	c
0x20000242	0x00000000	Code	RO	339	.	ARM.Collect\$\$libinit\$\$0000001F	c

Build Output

Build Output Find In Files Browser

Target stopped. ST-Link Debugger L19 C:26

E:\ARM_course\CortexM4\manual\M4projects\NEW_sample\new_GLCD.uvprojx - μVision

File Edit View Project Flash Debug Peripherals Tools SVCS Window Help

RAM_debug

Project RAM.map font24.c font16.c main.c startup_stm32f40_41xxx.s font12.c lcd_log.c

E:\ARM_course\CortexM4\manual\M4projects\NEW_sample\RAM\RAM.map

Execution Region RW_IRAM1 (Base: 0x20010000, Size: 0x00001558, Max: 0x00010000, ABSOLUTE)

Base Addr	Size	Type	Attr	Idx	E	Section Name	Object
0x20010000	0x0000004c	Data	RW		70	.data	stm324xg_eval_o
0x2001004c	0x00000010	Data	RW		170	.data	stm32f4xx_rcc.o
0x2001005c	0x000001ee	Data	RW		193	.data	lcd_log.o
0x2001024a	0x00000002	PAD					
0x2001024c	0x00000014	Data	RW		237	.data	system_stm32f4.o
0x20010260	0x00000c98	Zero	RW		192	.bss	lcd_log.o
0x20010ef8	0x00000060	Zero	RW		308	.bss	c_w.l(libspace.o)
0x20010f58	0x00000200	Zero	RW		228	HEAP	startup_stm32f4.o
0x20011158	0x00000400	Zero	RW		227	STACK	startup_stm32f4.o

====

Image component sizes

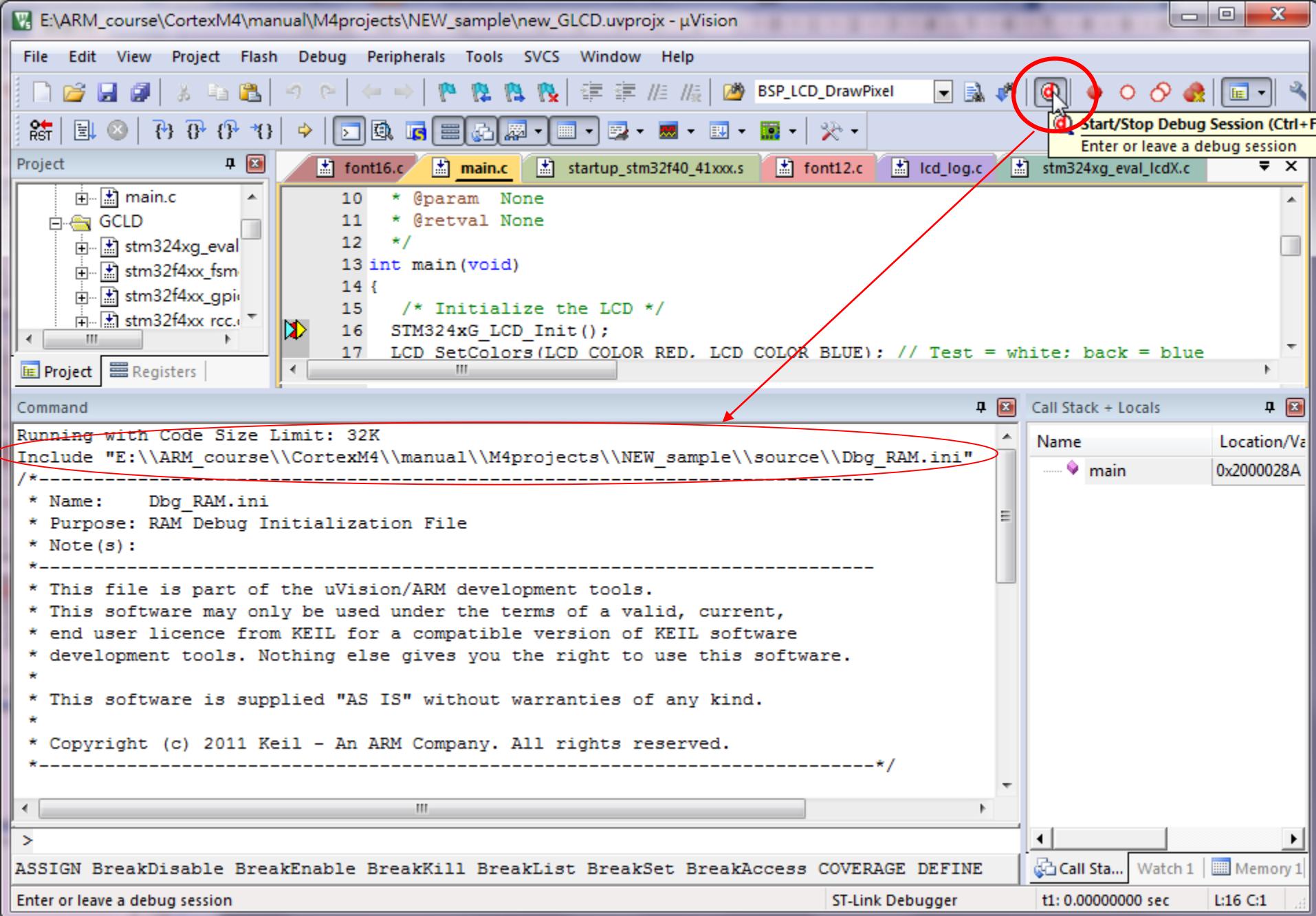
Code (inc. data)	RO Data	RW Data	ZI Data	Debug	Object Name
1540	98	0	494	3224	lcd_log.o
216	92	0	0	251479	main.o
64	26	392	0	1536	startup_stm32f40_41xxx.o

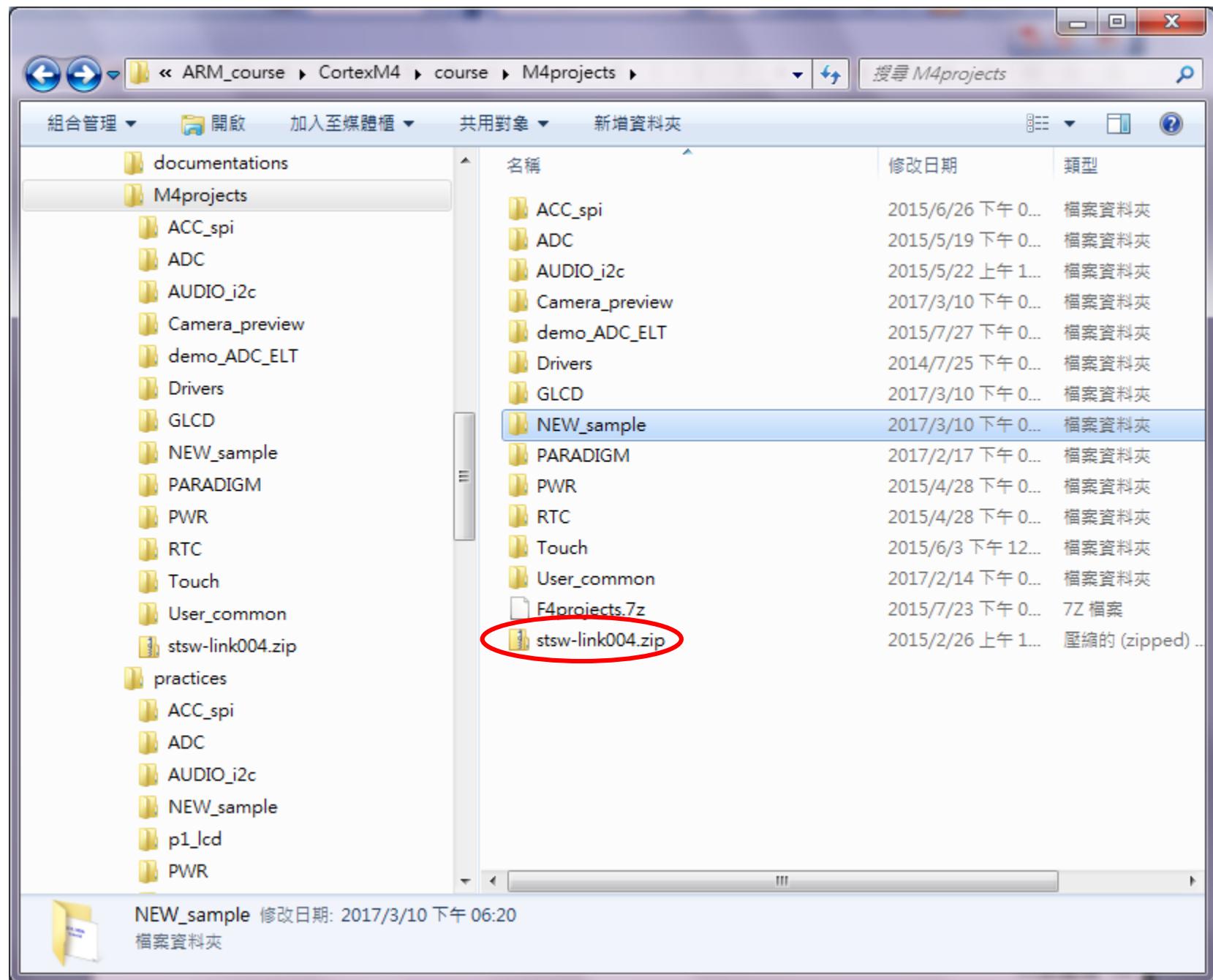
P.. B.. { F.. O.. T.. |

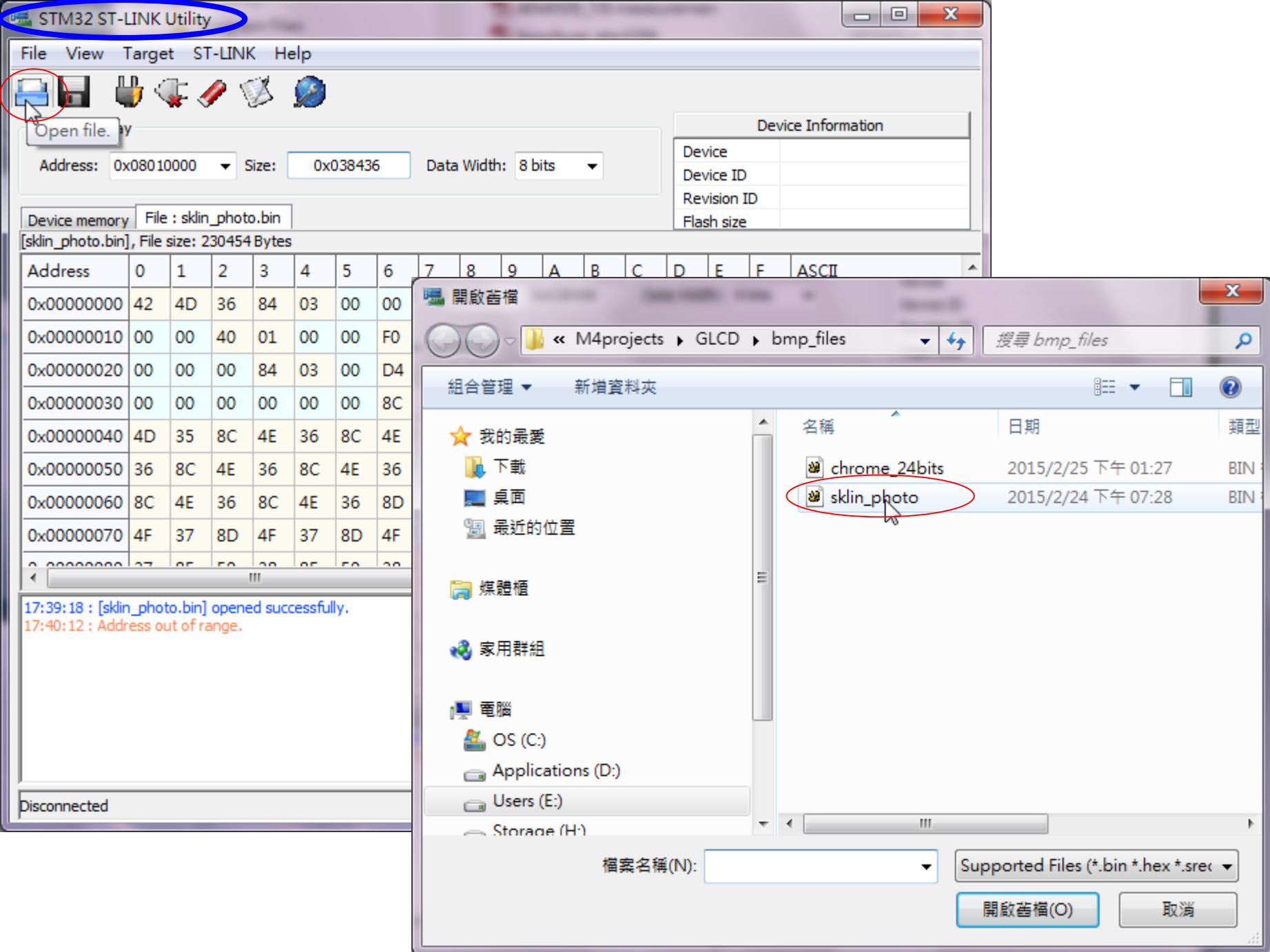
Build Output

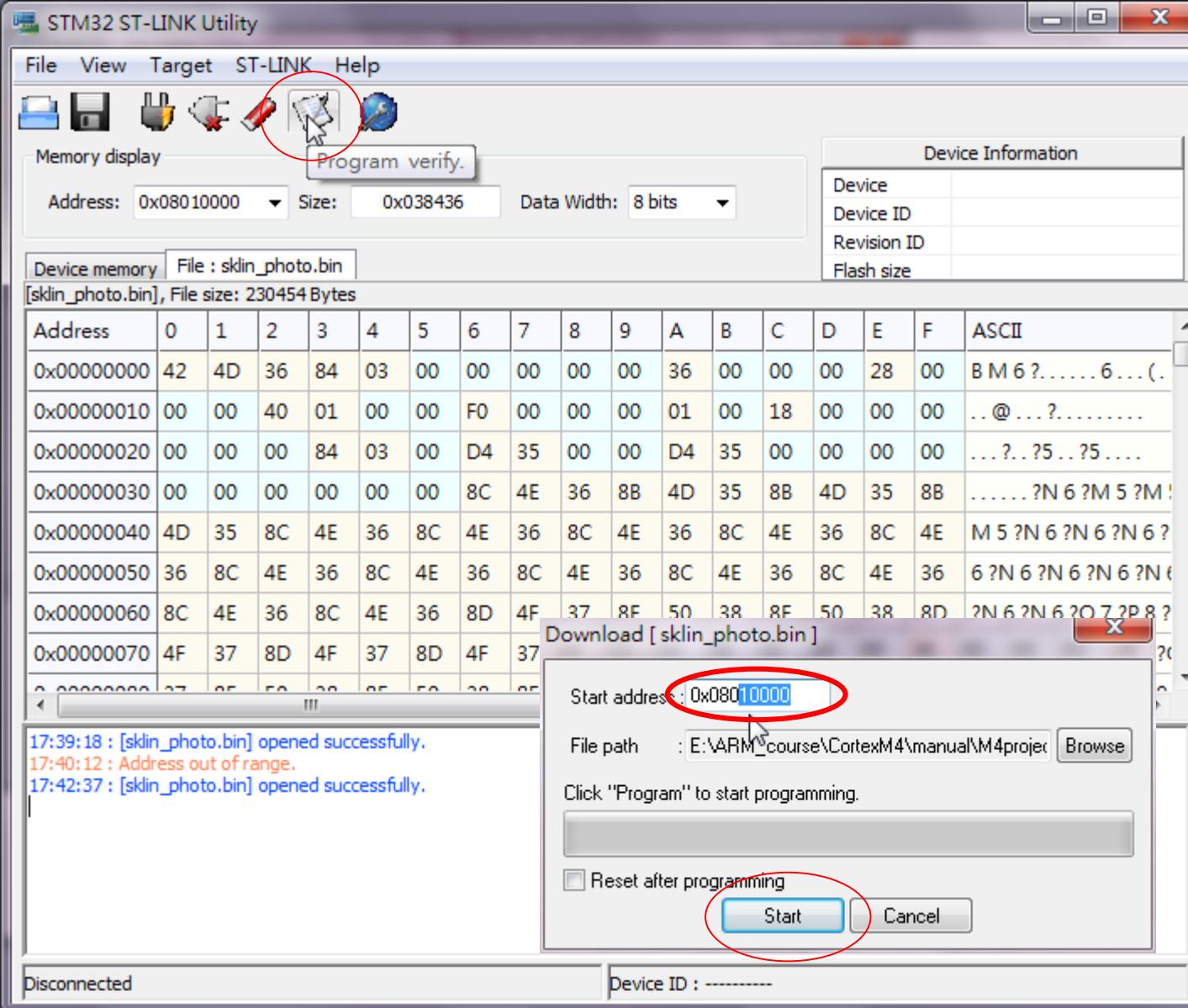
Build Output Find In Files Browser

Target stopped. ST-Link Debugger L19 C:26









```
GPIO_Ini2.c system_stm32f4xx.c includeBinary.s lcd_log.c new_GLCD.sct stm324xg_eval_LcdX.c GPIO_Ini1.c main.c
10 static void delay(__IO uint32_t nCount);
11 void GLCD_Value(uint8_t row_pixel, uint8_t col_no, int16_t val);
12 extern uint8_t startAddress;
13
14 void stm32f4_Hardware_Init (void);
15
16 /**
17 * @brief Main program
18 * @param None
19 * @retval None
20 */
21 int main(void)
22 {
23     stm32f4_Hardware_Init();
24
25     /* Initialize the LCD */
26     STM324xG_LCD_Init();
27     LCD_Clear(LCD_COLOR_BLACK);
28     LCD_SetColors(LCD_COLOR_RED, LCD_COLOR_BLUE); // Text = red; back = blue
29
30 //===== (Discovery F4 + TAO TAOTECH Board) GLCD test ;
31 LCD_RGB_Test();
32
33 LCD_Clear(LCD_COLOR_BLACK);
34 LCD_LOG_SetHeader("    TAO TAOTECH Board LCD Test");
35 LCD_LOG_SetFooter ("    Copyright (c) Shir-Kuan Lin, NCTU" );
36 LCD_DisplayStringLine(LCD_LINE(4),"PARADIGM LCD DEMO");
37 delay(250); /* delay 1000 ms */
38
39 LCD_DrawBitmap(0, 0, (uint8_t *) 0x08010000); // start at xPixel=0, yPixel=0
40 delay(500); /* delay 1000 ms */
41
42 MenuInit();
43 LCD_LOG_SetFooter ("    Copyright (c) Shir-Kuan Lin, NCTU" );
44
```

