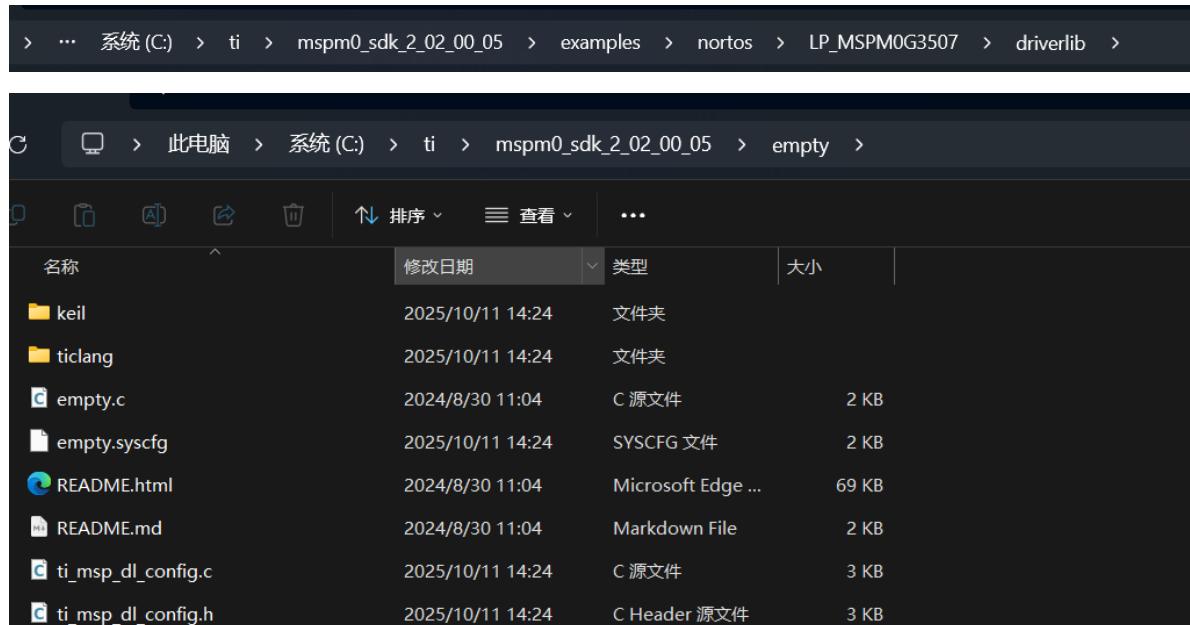


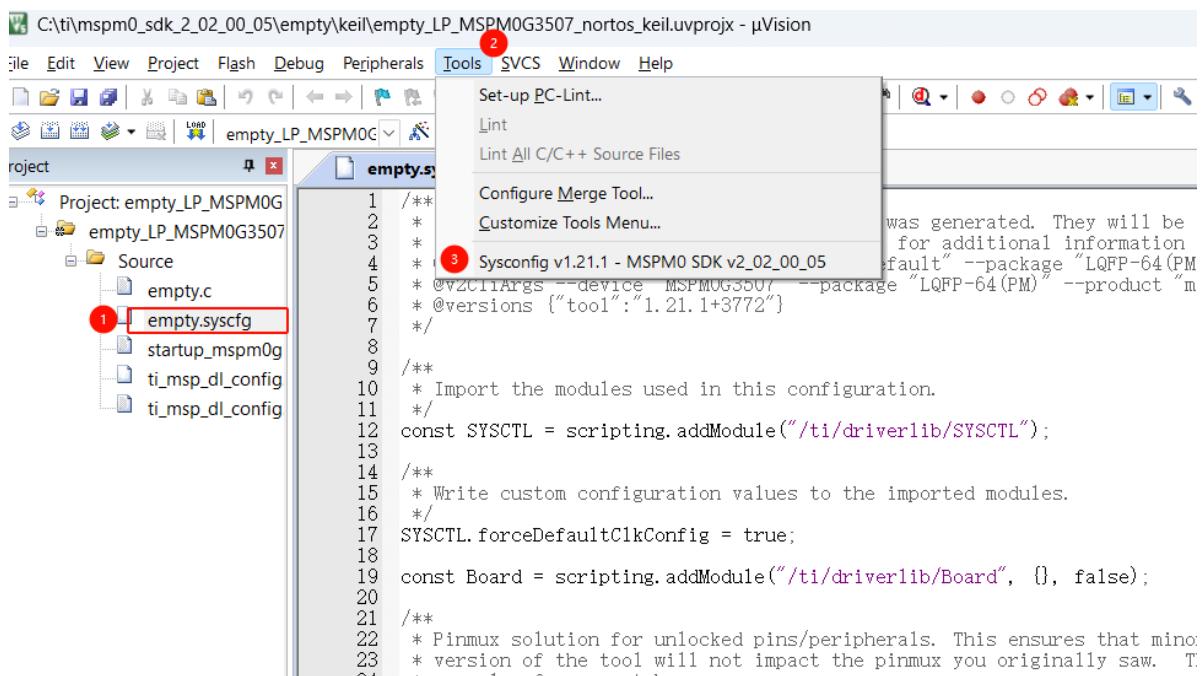
MSPM0 Clock Configuration

If MSPM0 uses the internal crystal oscillator, the maximum CPU clock frequency can only be set to (32MHz). We have added a 40MHz high-frequency clock on the board. In this section, we will configure the clock tree to make MSPM0 work at 80MHz clock frequency.

Copy the empty project from the SDK to the SDK path



Double-click empty.syscfg to open the file, then click on the sysconfig tool under tool in the toolbar



After opening the sysconfig tool, we enable the clock tree under SYSCTL

SysConfig - C:\ti\mspm0_sdk_2_02_00_05\empty\empty.syscfg*

FILE **ABOUT**

Type Filter Text... X ← → Software > SYSCTL

PROJECT CONFIGURATION...
Project Config... 1/1 ✓ **ADD** **REMOVE ALL**

MSPM0 DRIVER LIBRARY ...

SYSTEM (9)

- Board 1/1 ✓ **+**
- Configuration NVM **+**
- DMA **+**
- GPIO **+**
- MATHACL **+**
- RTC **+**
- SYSCTL** 1/1 ✓ **+** **1**
- SYSTICK **+**
- WWDT **+**

ANALOG (6)

- ADC12 **+**
- COMP **+**
- DAC12 **+**
- GPAMP **+**
- OPA **+**
- VREF **+**

COMMUNICATIONS (6)

Graphical Clock Configuration

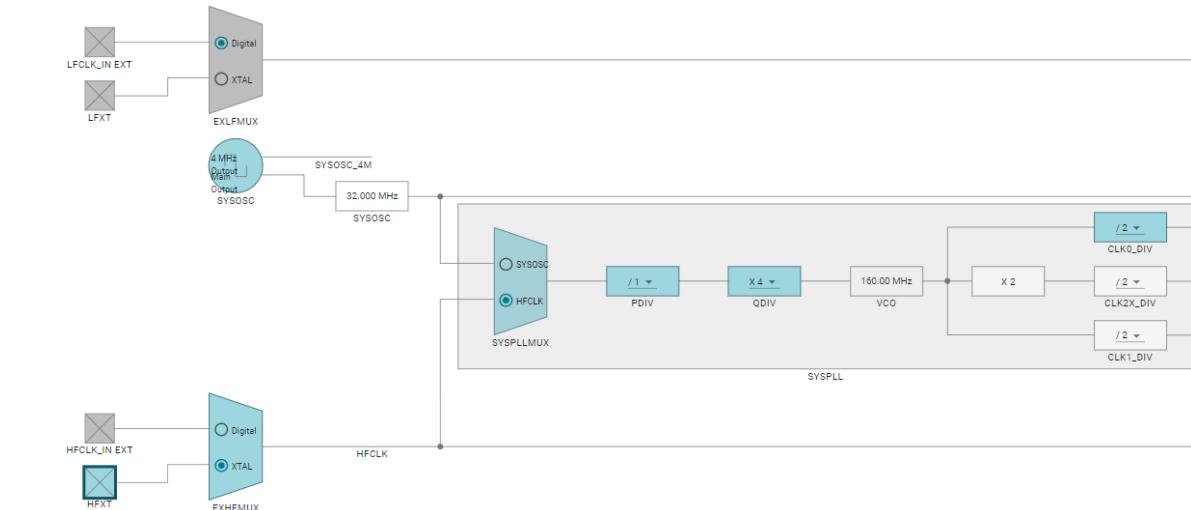
Power & Systems Configuration

- Run Power Policy RUN0
- Low Power Policy SLEEP0
- Supplied Operational Voltage (VDD)... 3.3
- BOR Threshold 0
- Enable Write Lock
- Enable Sleep On Exit
- Enable Event On Pending
- Disable NRST Pin
- VBOOST Operating Mode ONDEMAND

Flash Controller (FlashCtl) Configuration

PDU PA6/HFCLK_IN/HFXOUT | 46 OSC_OUT1 X
PA5/HFXIN/FCC_IN | 45 OSC_IN1 X

From the schematic, we can see that our crystal is connected to PA5 and PA6 pins



HFXT

Type	Pin Function	RUN0	SLEEP0
Input Frequency (MHz)	40	80 MHz	UNAVAILABLE
Enable HFXT	<input checked="" type="checkbox"/>	32.768 kHz	32.768 kHz
HFXT Frequency Range	40.000 MHz	80 MHz	80 MHz
HFXT Startup Time	32 and 48 MHz	4 MHz	4 MHz
	100	DISABLED	DISABLED

The configuration can refer to the figure below and can be modified according to your actual situation



After saving, we return to Keil and compile directly. We will see two errors, which are caused by incorrect header file paths.

The screenshot shows two Keil IDE windows. The top window displays the project structure for 'empty_LP_MSPM0G' and the content of the file 'ti_msp_dl_config.h'. The bottom window shows the build output and the 'Device' tab of the project options dialog for 'empty_LP_MSPM0G3507_nortos_keil'. The build output shows compilation errors due to missing header files. The project options dialog shows compiler settings like language (C99/C++11), optimization (-O2), and include paths.

```

Project: empty_LP_MSPM0G
  empty_LP_MSPM0G3507
    Source
      empty.c
      empty.syscfg
      startup_mspm0g
      ti_msp_dl_config
      ti_msp_dl_config

empty.syscfg
empty.c
ti_msp_dl_config.h

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25  * EXEMPLARY, OR CONSEQUENTIAL DAMAGES (INCLUDING, BUT NOT LIMITED TO,
26  * PROCUREMENT OF SUBSTITUTE GOODS OR SERVICES; LOSS OF USE, DATA, OR PROFIT
27  * OR BUSINESS INTERRUPTION) HOWEVER CAUSED AND ON ANY THEORY OF LIABILITY,
28  * WHETHER IN CONTRACT, STRICT LIABILITY, OR TORT (INCLUDING NEGLIGENCE OR
29  * OTHERWISE) ARISING IN ANY WAY OUT OF THE USE OF THIS SOFTWARE,
30  * EVEN IF ADVISED OF THE POSSIBILITY OF SUCH DAMAGE.
31 */
32 */
33 /**
34 * ===== ti_msp_dl_config.h =====
35 * Configured MSPM0 DriverLib module declarations
36 *
37 * DO NOT EDIT - This file is generated for the MSPM0G350X
38 * by the SysConfig tool.
39 */
40 #ifndef ti_msp_dl_config_h

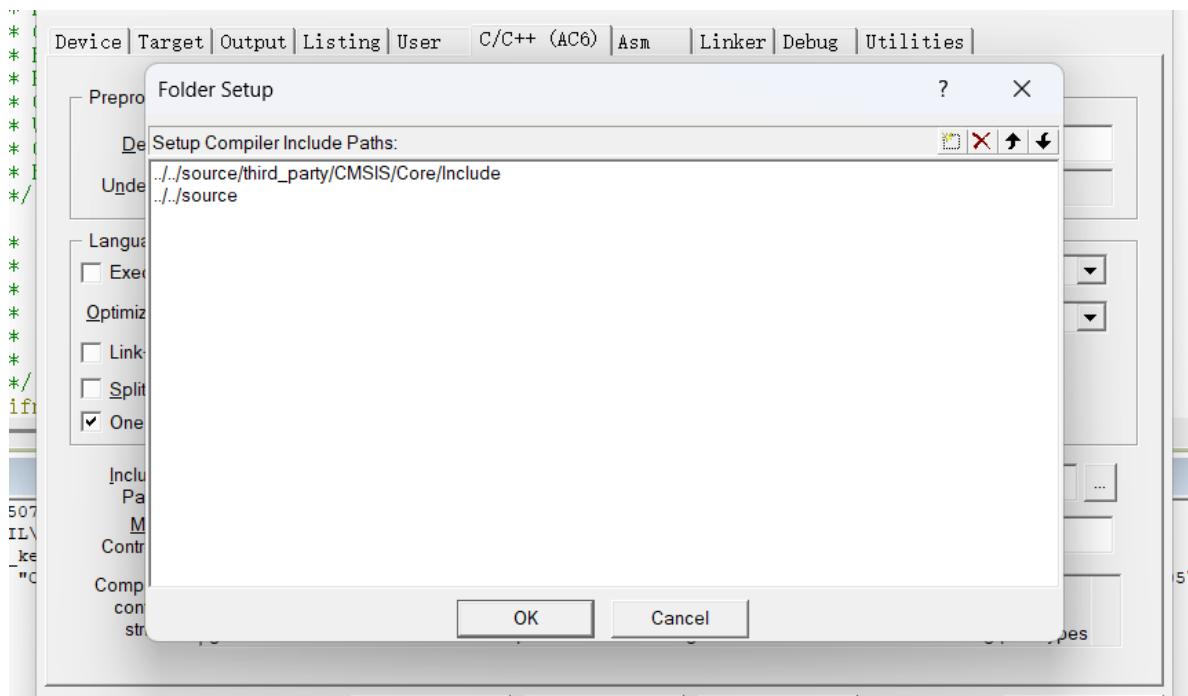
Build Output
..../ti_msp_dl_config.c(41): warning: In file included from...
..../ti_msp_dl_config.h(54): error: 'ti/devices/msp/msp.h' file not found
#include <ti/devices/msp/msp.h>
^~~~~~
1 error generated.
compiling ti_msp_dl_config.c...
..../empty.c(33): warning: In file included from...
..../ti_msp_dl_config.h(54): error: 'ti/devices/msp/msp.h' file not found
#include <ti/devices/msp/msp.h>
^~~~~~
1 error generated.
compiling empty.c...
assembling startup_mspm0g350x_uvision.s...
".\Objects\empty_LP_MSPM0G3507_nortos_keil.axf" - 2 Error(s), 0 Warning(s).
Target not created.
Build Time Elapsed: 00:00:00

C:\ti\msp0_sdk_2_02_00_05\empty\keil\empty_LP_MSPM0G3507_nortos_keil.uvproj - µVision
Edit View Project Flash Debug Peripherals Tools SVCS Window Help
File Project Options Device Target Output Listing User C/C++ (A06) Asm Linker Debug Utilities
empty_LP_MSPM0G empty_LP_MSPM0G3507
Source
  empty.c
  empty.syscfg
  startup_mspm0g
  ti_msp_dl_config
  ti_msp_dl_config

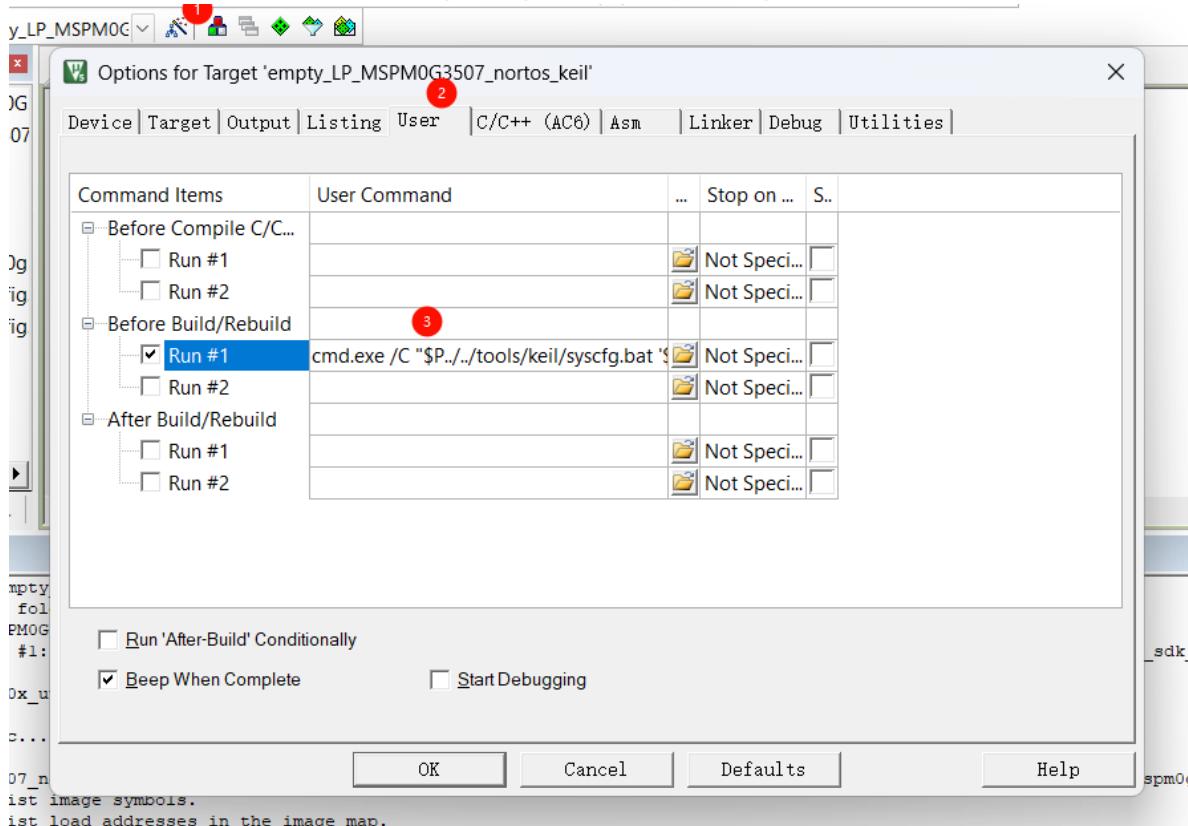
ti_msp_dl_config.h
Project: empty_LP_MSPM0G
  Options for Target 'empty_LP_MSPM0G3507_nortos_keil'
  empty_LP_MSPM0G3507_nortos_keil
  Device Target Output Listing User C/C++ (A06) Asm Linker Debug Utilities
  Preprocessor Symbols
    Define: __MSPM0G3507__
    Undefine:
  Language / Code Generation
    Execute-only Code
    Warnings: MISRA Compatible
    Language C: c99
    Optimization: -O2
    Turn Warnings into Errors
    Language C++: c++11
    Link-Time Optimization
    Plain Char is Signed
    Read-Only Position Independent
    Short enums/wchar
    Split Load and Store Multiple
    use RTTI
    One ELF Section per Function
    Read-Write Position Independent
    No Auto Includes
  Include Paths: ./././././source/third_party\CMSIS/Core/include.../././././source/./source/ti/devices/msp
  Misc Controls:
  Compiler Control String: xc-std=c99-target=arm-arm-none-eabi-mcpu=cortex-m0plus-c
                           -fno-rtti -funsigned-char -fshort-enums -fshort-wchar
                           -gdwarf4 -O2 -ffunction-sections -Wno-packed-Wno-missing-variable-declarations -Wno-missing-prototypes
  OK Cancel Defaults Help

```

We need to modify the relative paths of these two folders as shown below



After modification, we need to change the path of the sysconfig.bat file below as shown below

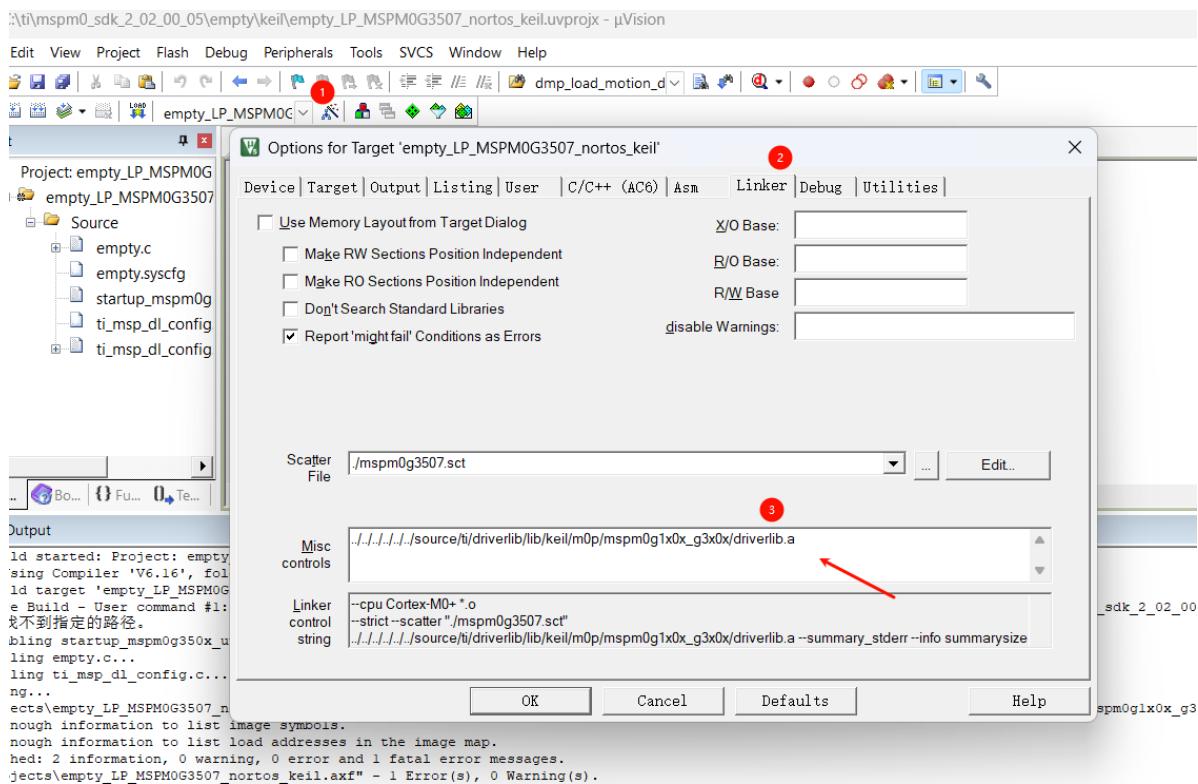


Compile again

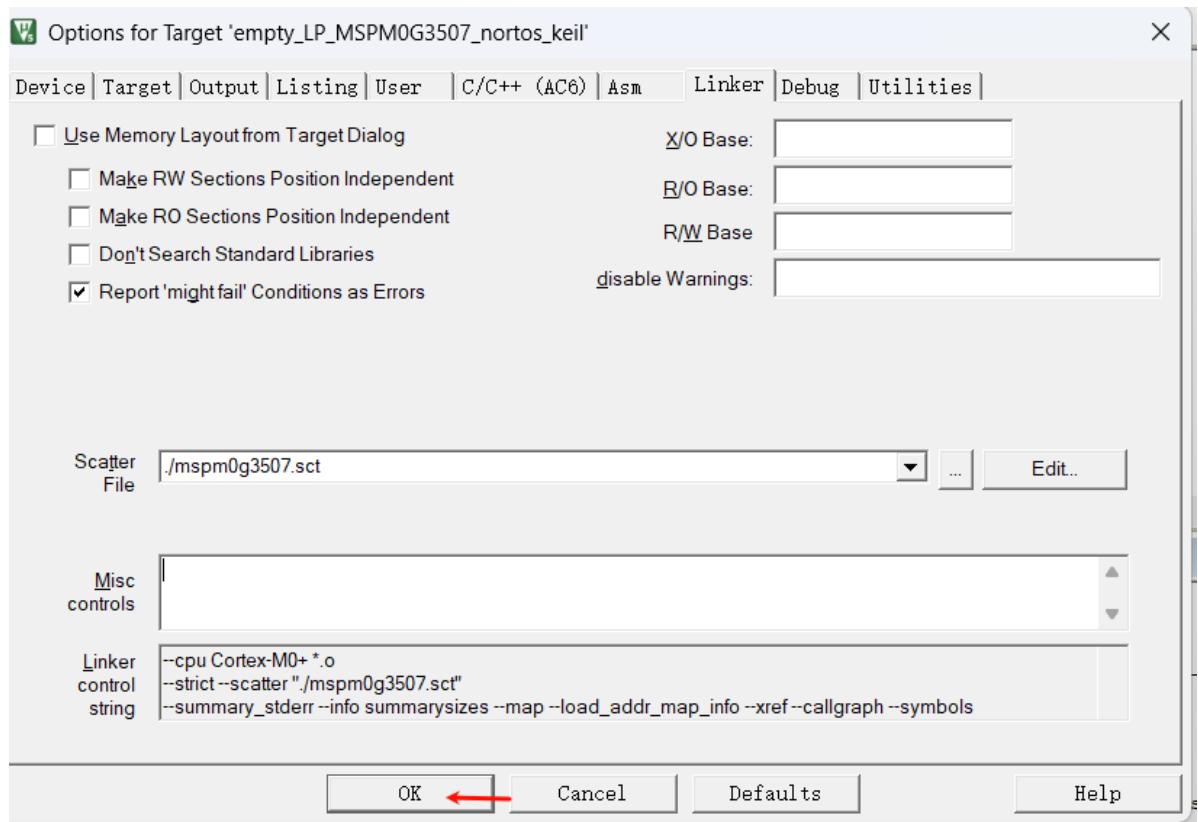
```

linking...
.\Objects\empty_LP_MSPM0G3507_nortos_keil.axf: error: L6002U: Could not open file ../../../../../../source/ti/driverlib/lib/keil/m0p/mspm0g3507_nortos_keil.a: No such file or directory
Not enough information to list image symbols.
Not enough information to list load addresses in the image map.
Finished: 2 information, 0 warning, 0 errors and 1 fatal error messages.
..\Objects\empty_LP_MSPM0G3507_nortos_keil.axf" - 1 Error(s), 0 Warning(s).
Target not created.
Build Time Elapsed: 00:00:01

```



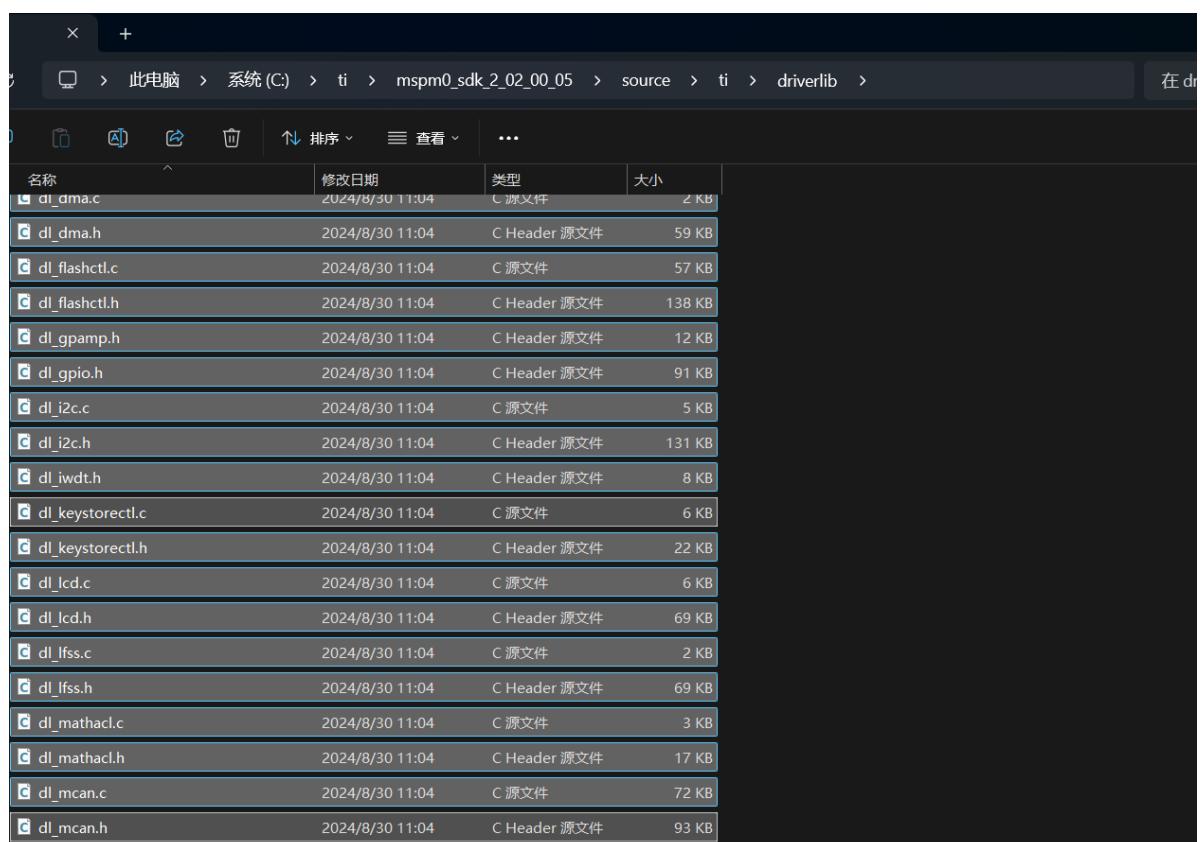
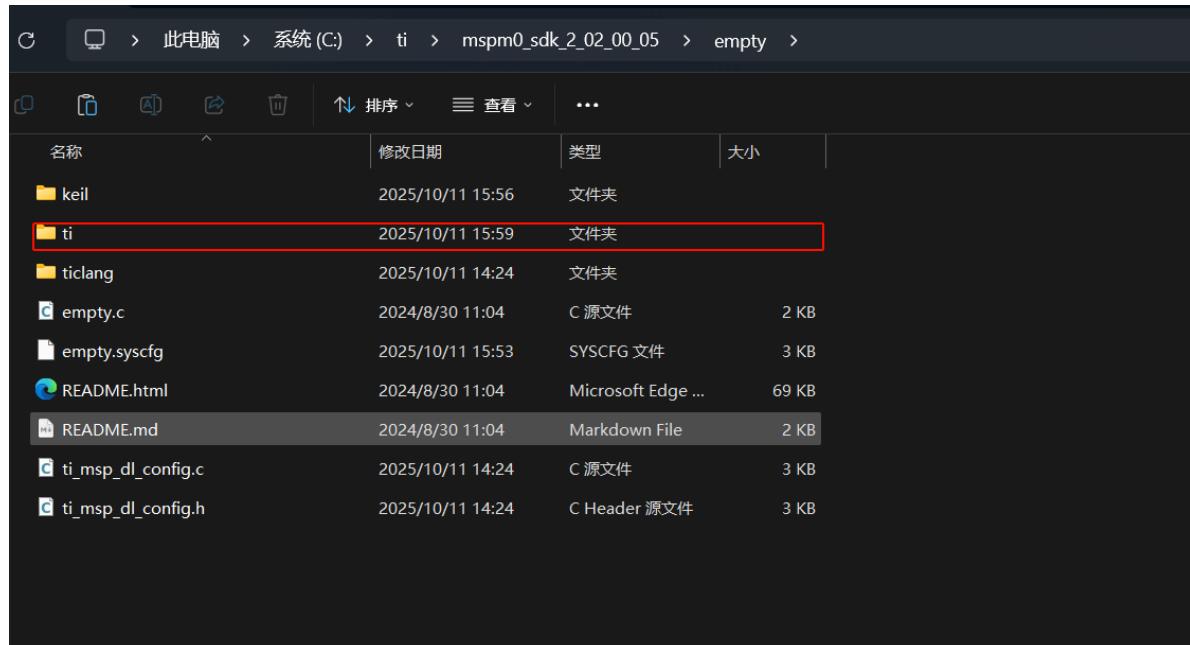
Delete this part of the content



After compiling again, the following error is reported

```
Before Build - User command #1: cmd.exe /C "C:\ti\mspm0_sdk_2_02_00_05\empty\keil\..\..\..\tools\keil\syscfg.bat 'C:\ti\mspm0_sdk_2_02_00_05\empty\keil\' empty.sysc"
Using Sysconfig Tool from "C:\ti\sysconfig_1.21.1\sysconfig_cli.bat"
"Update the file located at <sdk path>/tools/keil/syscfg.bat to use a different version"
Running script...
Validating...
Generating Code (empty.syscfg)...
Writing C:\ti\mspm0_sdk_2_02_00_05\empty\ti_msp_dl_config.c...
Writing C:\ti\mspm0_sdk_2_02_00_05\empty\ti_msp_dl_config.h...
assembling startup_mspm0g350x_uvision.s...
compiling empty.c...
compiling ti_msp_dl_config.c...
linking...
.\Objects\empty_LP_MSPM0G3507_nortos_keil.axf: Error: L6218E: Undefined symbol DL_Common_delayCycles (referred from ti_msp_dl_config.o).
.\Objects\empty_LP_MSPM0G3507_nortos_keil.axf: Error: L6218E: Undefined symbol DL_SYSCTL_configSYSPLL (referred from ti_msp_dl_config.o).
.\Objects\empty_LP_MSPM0G3507_nortos_keil.axf: Error: L6218E: Undefined symbol DL_SYSCTL_setHCLKSourceHFXTParams (referred from ti_msp_dl_config.o).
.\Objects\empty_LP_MSPM0G3507_nortos_keil.axf: Error: L6218E: Undefined symbol DL_SYSCTL_switvhMCLKfromSYSOSCtoHSCLK (referred from ti_msp_dl_config.o).
```

We create a new ti folder in the project path, then copy all source files and header files from the driverlib directory in the SDK path to the ti folder as shown below



Then we need to enter this folder in the SDK directory:

mspm0_sdk_2_02_00_05\source\ti\driverlib\m0p\sysctl and copy the two selected files below to the ti directory

C > 此电脑 > 系统 (C:) > ti > mspm0_sdk_2_02_00_05 > source > ti > driverlib > m0p > sysctl

在 sysctl 中

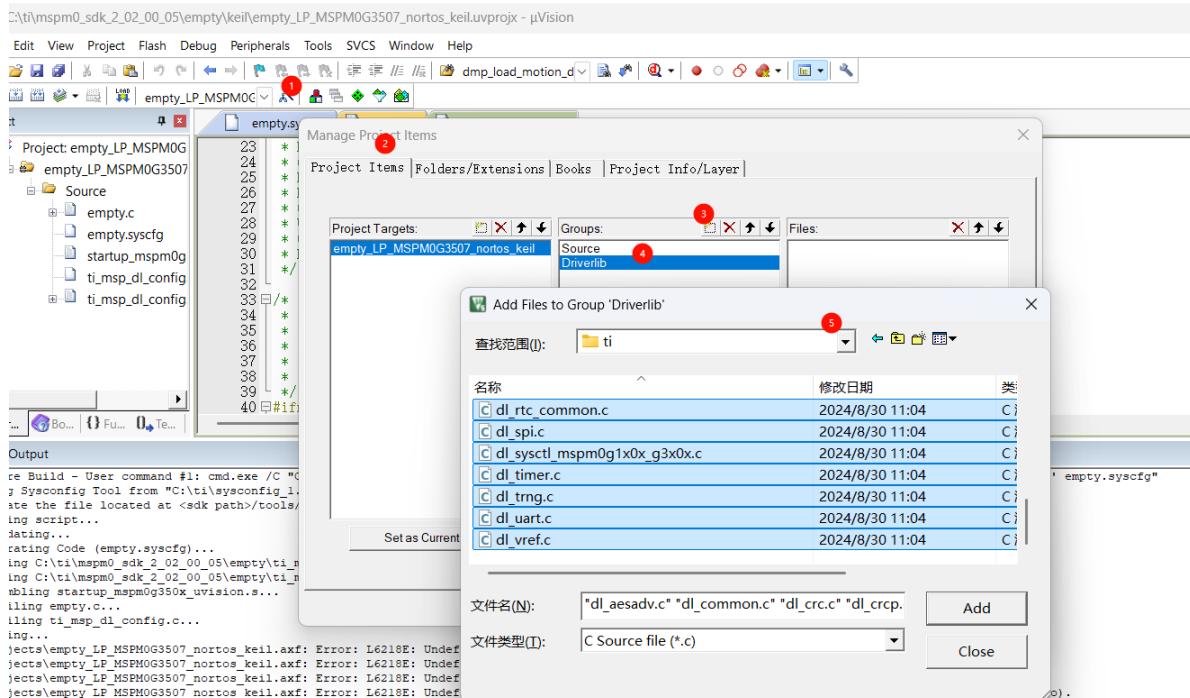
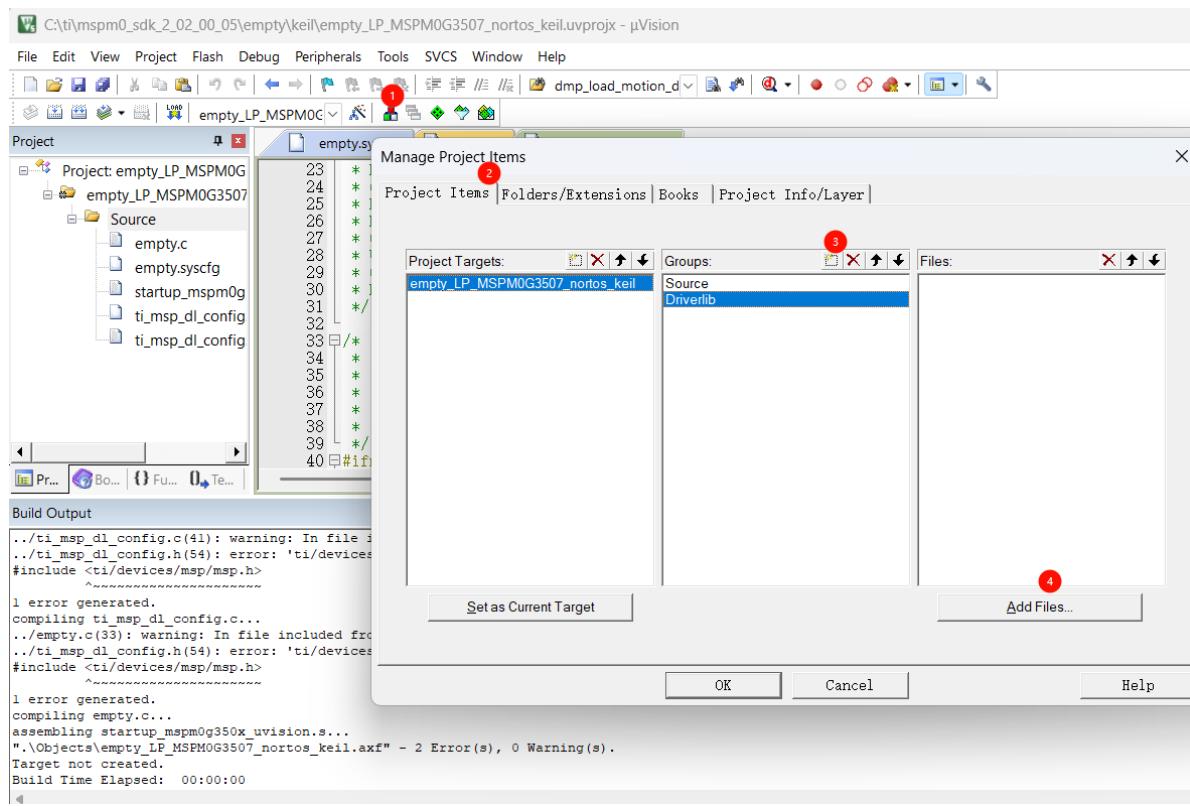
名称	修改日期	类型	大小
dl_sysctl_mspm0c110x.c	2024/8/30 11:04	C 源文件	7 KB
dl_sysctl_mspm0c110x.h	2024/8/30 11:04	C Header 源文件	70 KB
dl_sysctl_mspm0g1x0x_g3x0x.c	2024/8/30 11:04	C 源文件	13 KB
dl_sysctl_mspm0g1x0x_g3x0x.h	2024/8/30 11:04	C Header 源文件	103 KB
dl_sysctl_mspm0gx51x.c	2024/8/30 11:04	C 源文件	15 KB
dl_sysctl_mspm0gx51x.h	2024/8/30 11:04	C Header 源文件	127 KB
dl_sysctl_mspm0l11xx_l13xx.c	2024/8/30 11:04	C 源文件	6 KB
dl_sysctl_mspm0l11xx_l13xx.h	2024/8/30 11:04	C Header 源文件	72 KB
dl_sysctl_mspm0l122x_l222x.c	2024/8/30 11:04	C 源文件	10 KB
dl_sysctl_mspm0l122x_l222x.h	2024/8/30 11:04	C Header 源文件	108 KB

As shown below

C > 此电脑 > 系统 (C:) > ti > mspm0_sdk_2_02_00_05 > empty > ti

名称	修改日期	类型	大小
dl_spi.c	2024/8/30 11:04	C 源文件	9 KB
dl_spi.h	2024/8/30 11:04	C Header 源文件	79 KB
dl_tamperio.h	2024/8/30 11:04	C Header 源文件	29 KB
dl_timer.c	2024/8/30 11:04	C 源文件	50 KB
dl_timer.h	2025/7/25 14:47	C Header 源文件	147 KB
dl_timera.h	2025/7/25 12:33	C Header 源文件	53 KB
dl_timerg.h	2024/8/30 11:04	C Header 源文件	31 KB
dl_trng.c	2024/8/30 11:04	C 源文件	3 KB
dl_trng.h	2024/8/30 11:04	C Header 源文件	21 KB
dl_uart.c	2024/8/30 11:04	C 源文件	12 KB
dl_uart.h	2025/8/28 15:52	C Header 源文件	116 KB
dl_uart_extend.h	2024/8/30 11:04	C Header 源文件	47 KB
dl_uart_main.h	2025/8/28 17:23	C Header 源文件	35 KB
dl_yref.c	2024/8/30 11:04	C 源文件	3 KB
dl_yref.h	2024/8/30 11:04	C Header 源文件	12 KB
dl_wwdt.h	2024/8/30 11:04	C Header 源文件	20 KB
driverlib.h	2024/8/30 11:04	C Header 源文件	4 KB
dl_sysctl_mspm0g1x0x_g3x0x.c	2024/8/30 11:04	C 源文件	13 KB
dl_sysctl_mspm0g1x0x_g3x0x.h	2024/8/30 11:04	C Header 源文件	103 KB

We create a new directory in the project to store these files. We name it Driverlib and then add all source files from the ti folder in the previous step to this directory



Compile again

C:\ti\mspm0_sdk_2_02_00_05\empty\keil\empty_LP_MSPM0G3507_nortos_keil.uvproj - μVision

File Edit View Project Flash Debug Peripherals Tools SVCS Window Help

empty_LP_MSPM0G3507

Project: empty_LP_MSPM0G

Source

- empty.c
- empty.syscfg
- startup_mspm0g
- ti_msp_dl_config
- Driverlib

empty.syscfg

```

7  * are met:
8  *
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```

Build Output

```

compiling dl_flashctl.c...
compiling dl_mathac1.c...
compiling dl_opa.c...
compiling dl_sysctl_mspm0glx0x_g3x0x.c...
compiling dl_spi.c...
compiling dl_rtc_common.c...
compiling dl_vref.c...
compiling dl_trng.c...
compiling dl_uuart.c...
compiling dl_mcan.c...
compiling dl_timer.c...
linking...
Program Size: Code=796 RO-data=252 RW-data=0 ZI-data=352
'romELF: creating hex file...
.\Objects\empty_LP_MSPM0G3507_nortos_keil.axf" - 0 Error(s), 0 Warning(s).
Build Time Elapsed: 00:00:02

```

At this point, our configuration is successful

empty_LP_MSPM0G3507

empty.syscfg

empty.c

empty.syscfg

startup_mspm0g

ti_msp_dl_config

Driverlib

empty.c

empty.syscfg

ti_msp_dl_config.h

```

68 */
69
70 /* clang-format off */
71
72 #define POWER_STARTUP_DELAY (16)
73
74 #define GPIO_HFXT_PORT GPIOA
75 #define GPIO_HFXIN_PIN DL_GPIO_PIN_5
76 #define GPIO_HFXIN_IOMUX (IOMUX_PINC10)
77 #define GPIO_HFXOUT_PIN DL_GPIO_PIN_6
78 #define GPIO_HFXOUT_IOMUX (IOMUX_PINC11)
79 #define CPUCLK_FREQ 8000000
80
81
82
83 /* clang-format on */
84
85
86 void SYSCTRL_DL_init(void);
87 void SYSCTRL_DL_initPower(void);
88 void SYSCTRL_DL_GPIO_init(void);
89 void SYSCTRL_DL_SYSCTL_init(void);
90
91
92 #ifndef __cplusplus
93 #endif
94
95
96 /* endif /* ti_msp_dl_config.h */
97

```