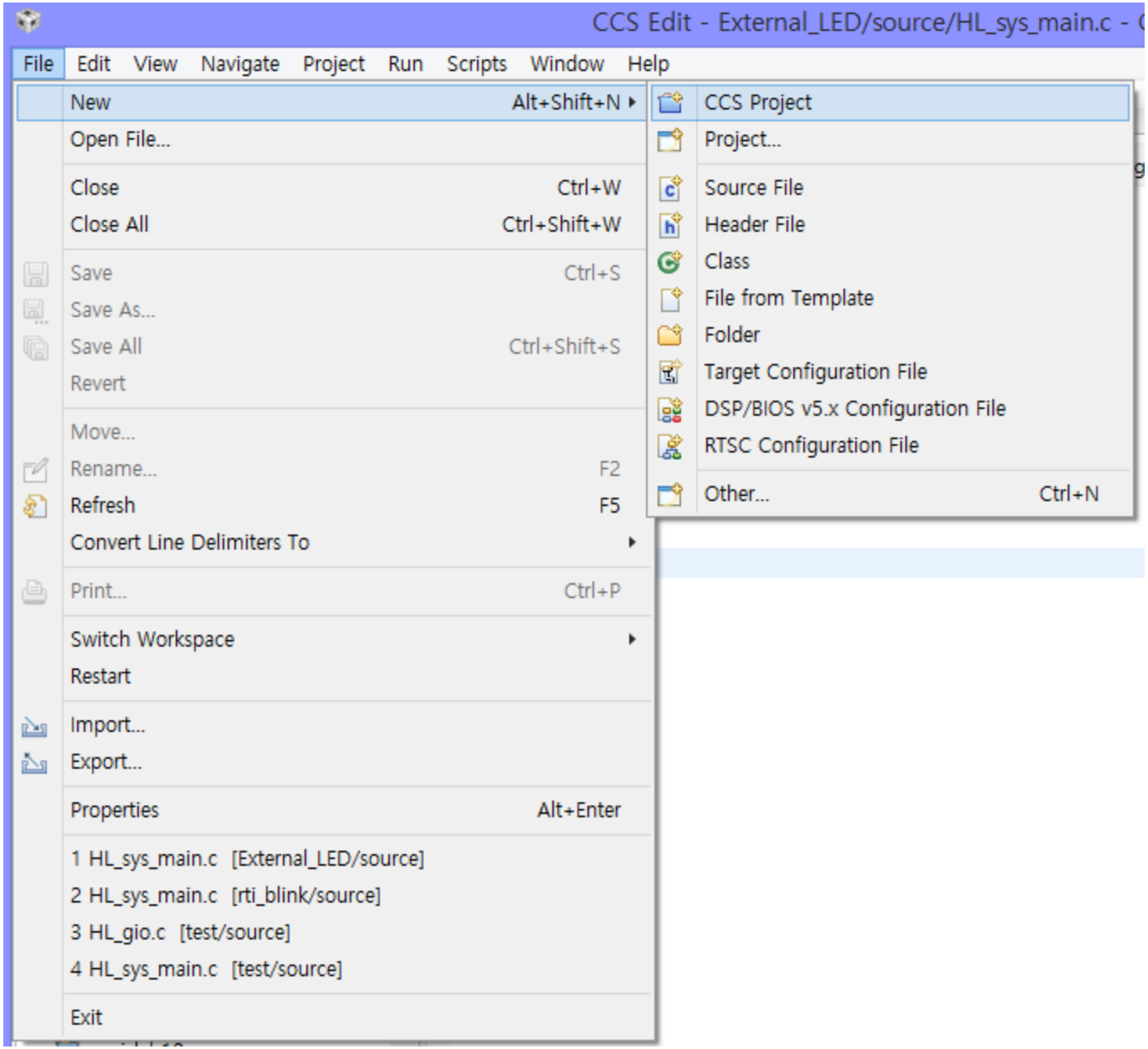
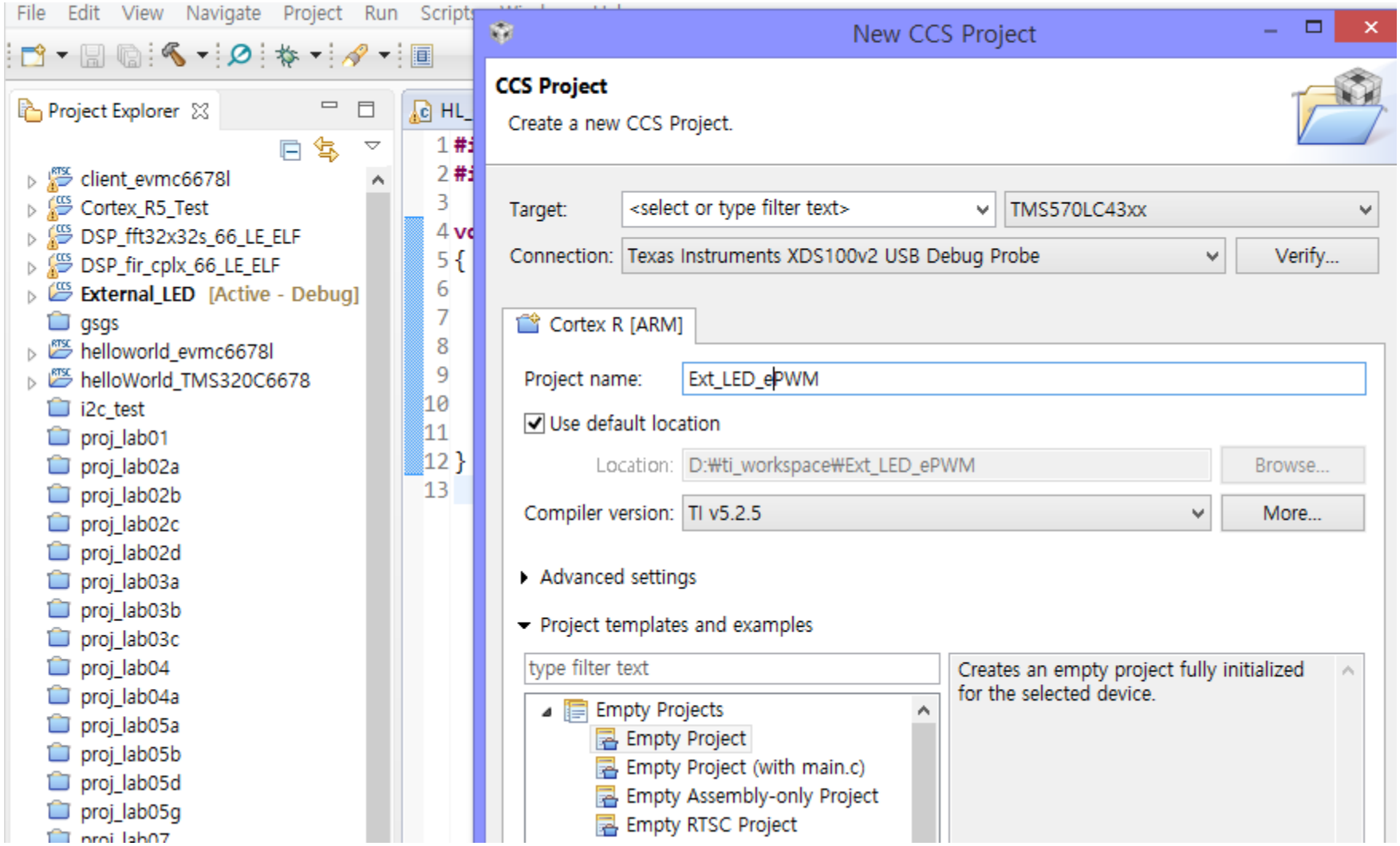
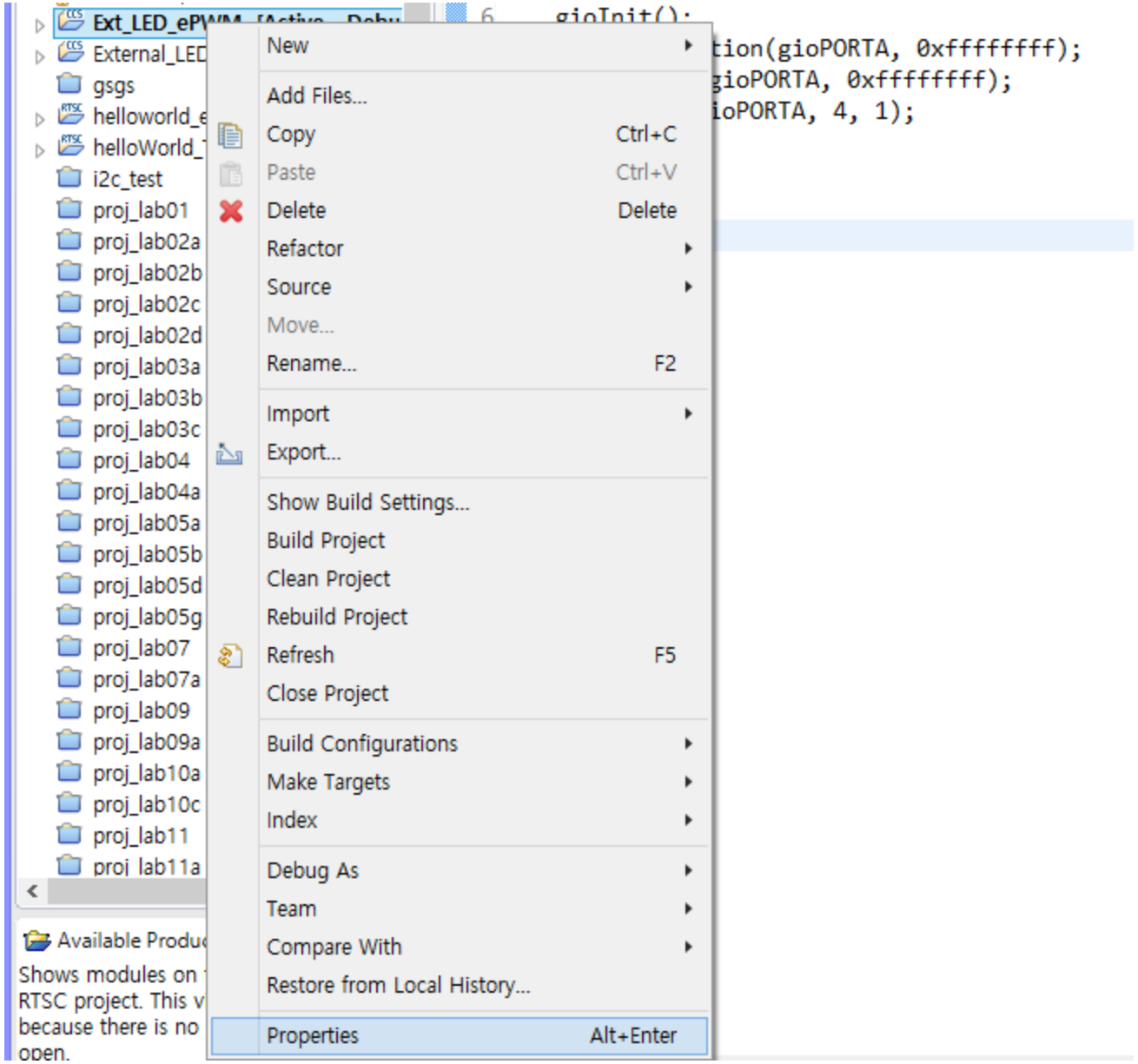
Xilinx Zynq FPGA, TI DSP, MCU 기반의 회로 설계 및 임베디드 전문가 과정

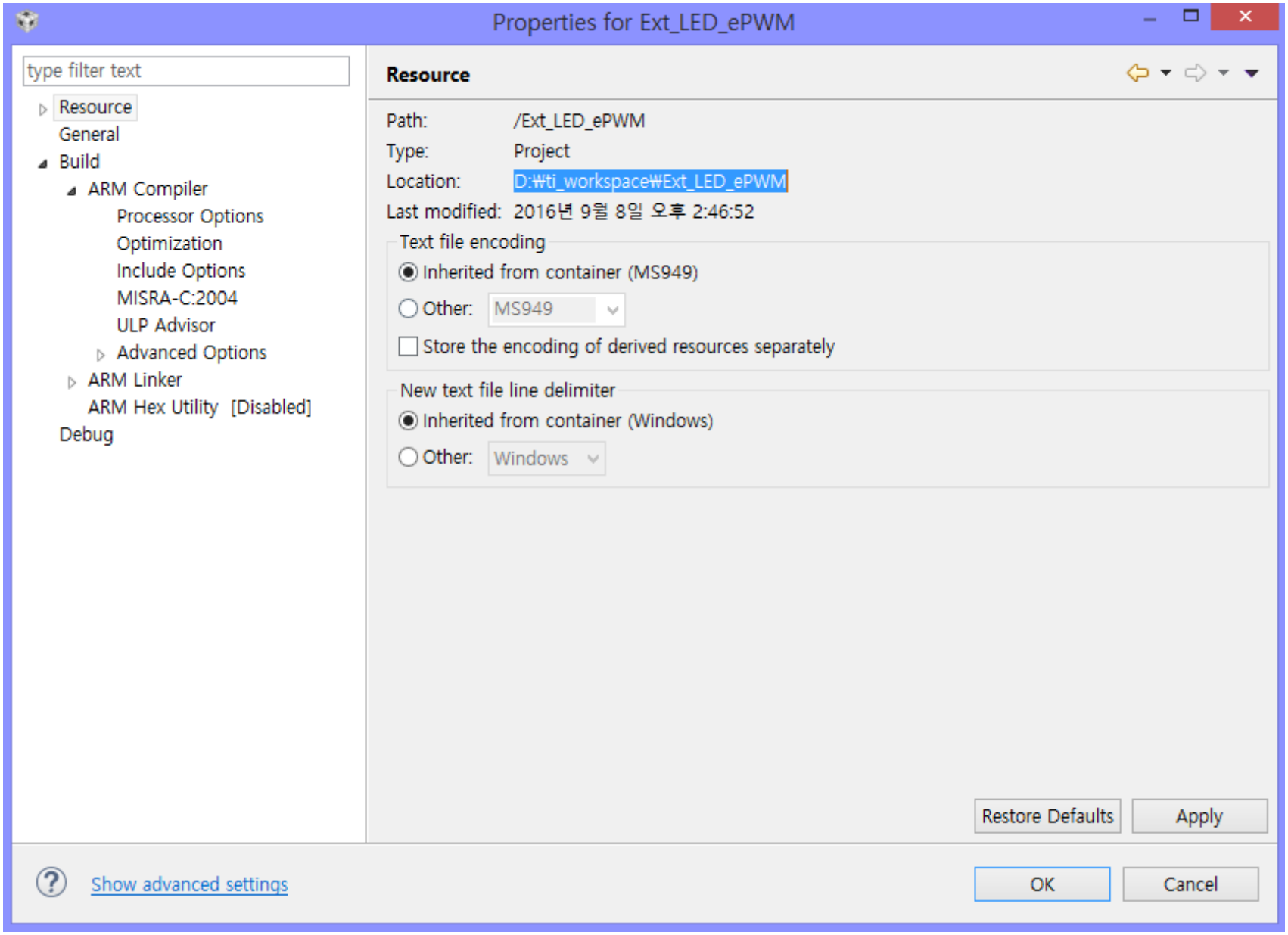
강사 – Innova Lee(이상훈)
gcccompil3r@gmail.com

External LED with etPWM Control

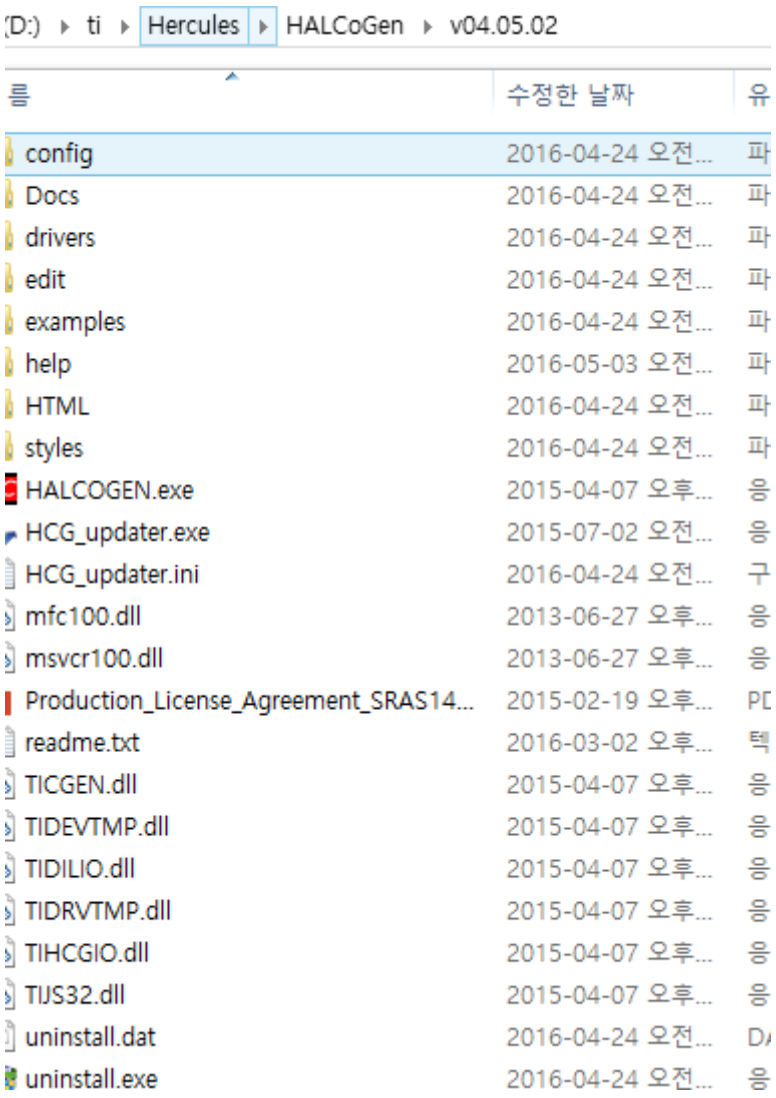

CCS Edit - External_LED/source/HL_sys_main.c -
File
Edit
View
Navigate
Project
Run
Scripts
Window
Help
New Alt+Shift+N
Open File...
Close Ctrl+W
Close All Ctrl+Shift+W
Save Ctrl+S
Save As...
Save All Ctrl+Shift+S
Revert
Move...
Rename... F2
Refresh F5
Convert Line Delimiters To
Print... Ctrl+P
Switch Workspace
Restart
Import...
Export...
Properties Alt+Enter
1 HL_sys_main.c [External_LED/source]
2 HL_sys_main.c [rti_blink/source]
3 HL_gio.c [test/source]
4 HL_sys_main.c [test/source]
Exit
CCS Project
Project...
Source File
Header File
Class
File from Template
Folder
Target Configuration File
DSP/BIOS v5.x Configuration File
RTSC Configuration File
Other... Ctrl+N

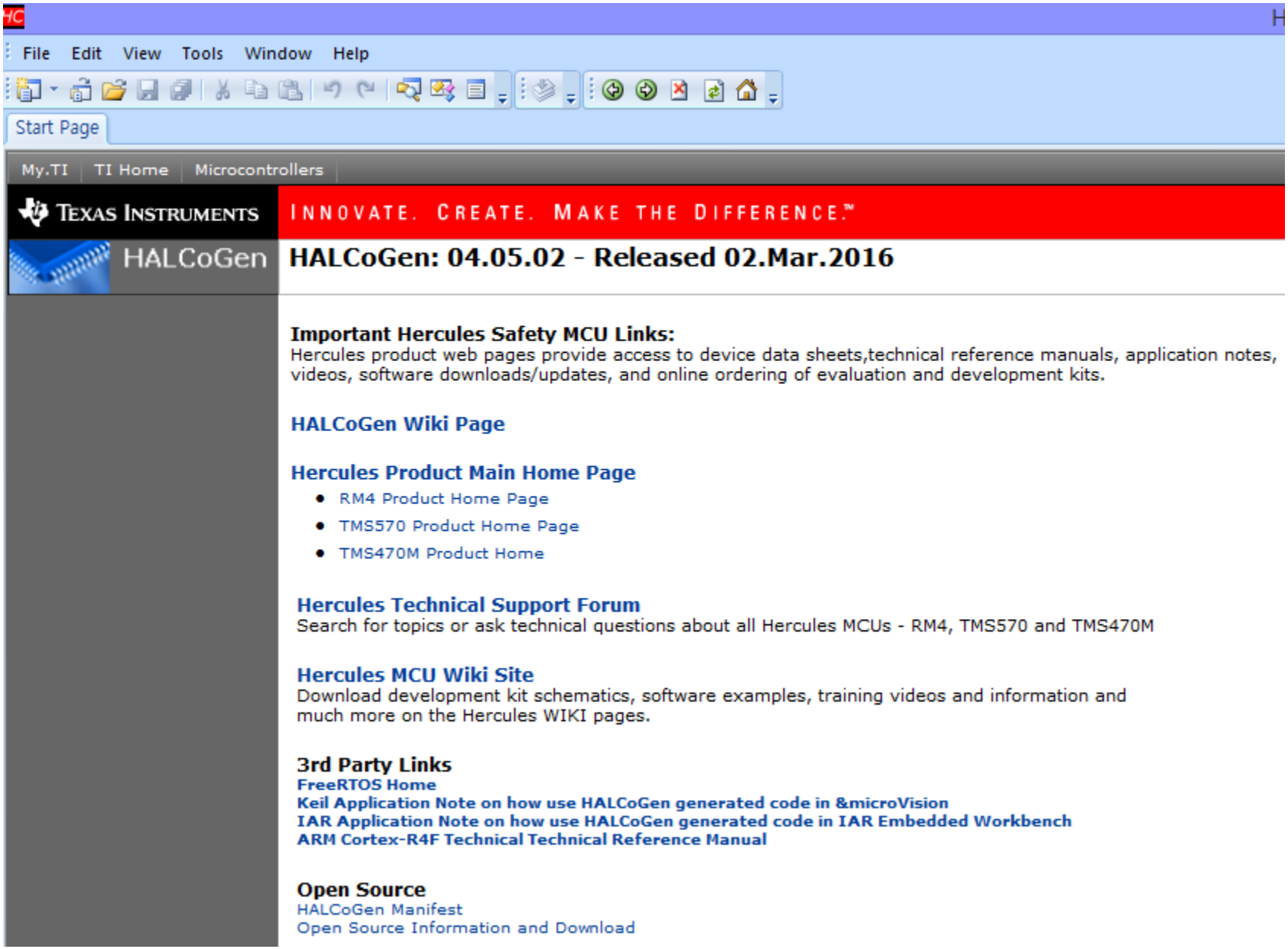

File Edit View Navigate Project Run Script
Project Explorer
client_evmc6678l
Cortex_R5_Test
DSP_fft32x32s_66_LE_ELF
DSP_fir_cplx_66_LE_ELF
External_LED [Active - Debug]
gsgs
helloworld_evmc6678l
helloWorld_TMS320C6678
i2c_test
proj_lab01
proj_lab02a
proj_lab02b
proj_lab02c
proj_lab02d
proj_lab03a
proj_lab03b
proj_lab03c
proj_lab04
proj_lab04a
proj_lab05a
proj_lab05b
proj_lab05d
proj_lab05g
HL_
1 #
2 #
3
4 vo
5 {
6
7
8
9
10
11
12 }
13
New CCS Project
CCS Project
Create a new CCS Project.
Target:
<select or type filter text>
TMS570LC43xx
Connection:
Texas Instruments XDS100v2 USB Debug Probe
Verify...
Cortex R [ARM]
Project name:
Ext_LED_ePWM
Use default location
Location:
D:₩ti_workspace₩Ext_LED_ePWM
Browse...
Compiler version:
TI v5.2.5
More...
Advanced settings
Project templates and examples
type filter text
Empty Projects
Empty Project
Empty Project (with main.c)
Empty Assembly-only Project
Empty RTSC Project
Creates an empty project fully initialized for the selected device.

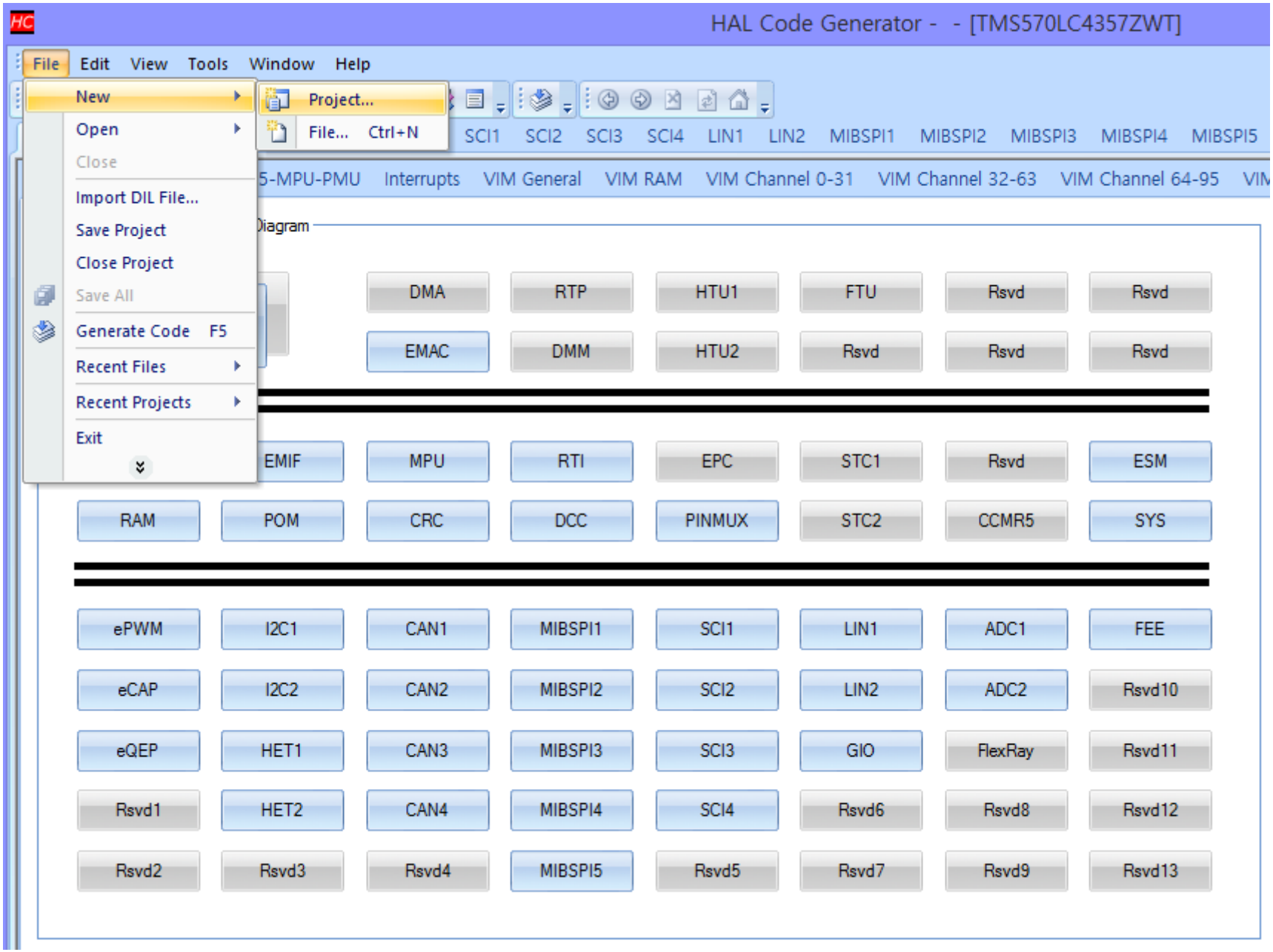

Ext_LED_ePWM
External_LED
gsgs
helloworld_e
helloWorld_1
i2c_test
proj_lab01
proj_lab02a
proj_lab02b
proj_lab02c
proj_lab02d
proj_lab03a
proj_lab03b
proj_lab03c
proj_lab04
proj_lab04a
proj_lab05a
proj_lab05b
proj_lab05d
proj_lab05g
proj_lab07
proj_lab07a
proj_lab09
proj_lab09a
proj_lab10a
proj_lab10c
proj_lab11
proj_lab11a
Available Produc
Shows modules on
RTSC project. This v
because there is no
open.
New
Add Files...
Copy Ctrl+C
Paste Ctrl+V
Delete Delete
Refactor
Source
Move...
Rename... F2
Import
Export...
Show Build Settings...
Build Project
Clean Project
Rebuild Project
Refresh F5
Close Project
Build Configurations
Make Targets
Index
Debug As
Team
Compare With
Restore from Local History...
Properties Alt+Enter
6 gioInit();
tion(gioPORTA, 0xffffffff);
gioPORTA, 0xffffffff);
ioPORTA, 4, 1);

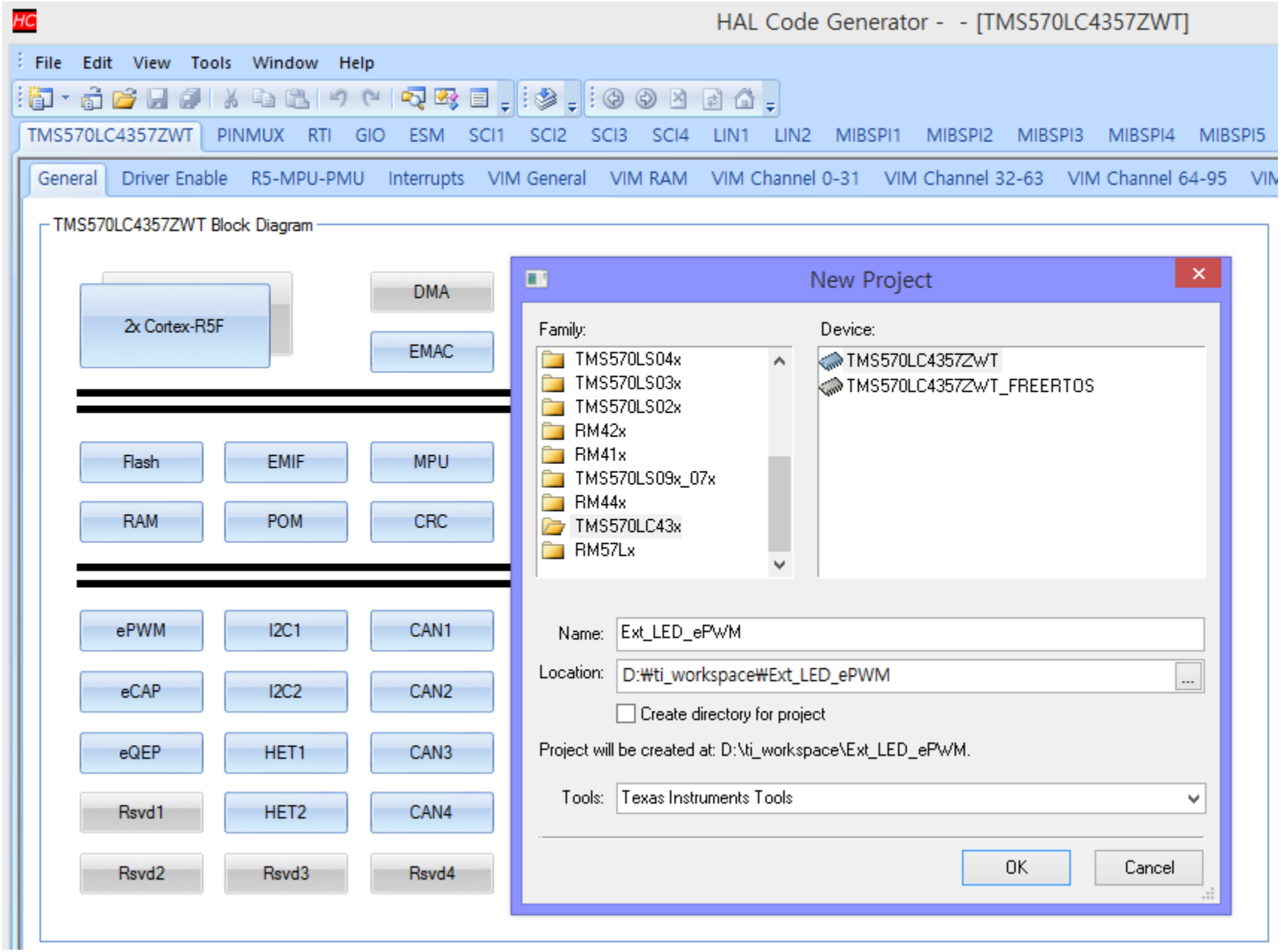

Properties for Ext_LED_ePWM
type filter text
Resource
General
Build
ARM Compiler
Processor Options
Optimization
Include Options
MISRA-C:2004
ULP Advisor
Advanced Options
ARM Linker
ARM Hex Utility [Disabled]
Debug
Resource
Path: /Ext_LED_ePWM
Type: Project
Location: D:₩ti_workspace₩Ext_LED_ePWM
Last modified: 2016년 9월 8일 오후 2:46:52
Text file encoding
Inherited from container (MS949)
Other: MS949
Store the encoding of derived resources separately
New text file line delimiter
Inherited from container (Windows)
Other: Windows
Restore Defaults
Apply
Show advanced settings
OK
Cancel

복사한 상태로 HALCoGen을 동작시킨다.

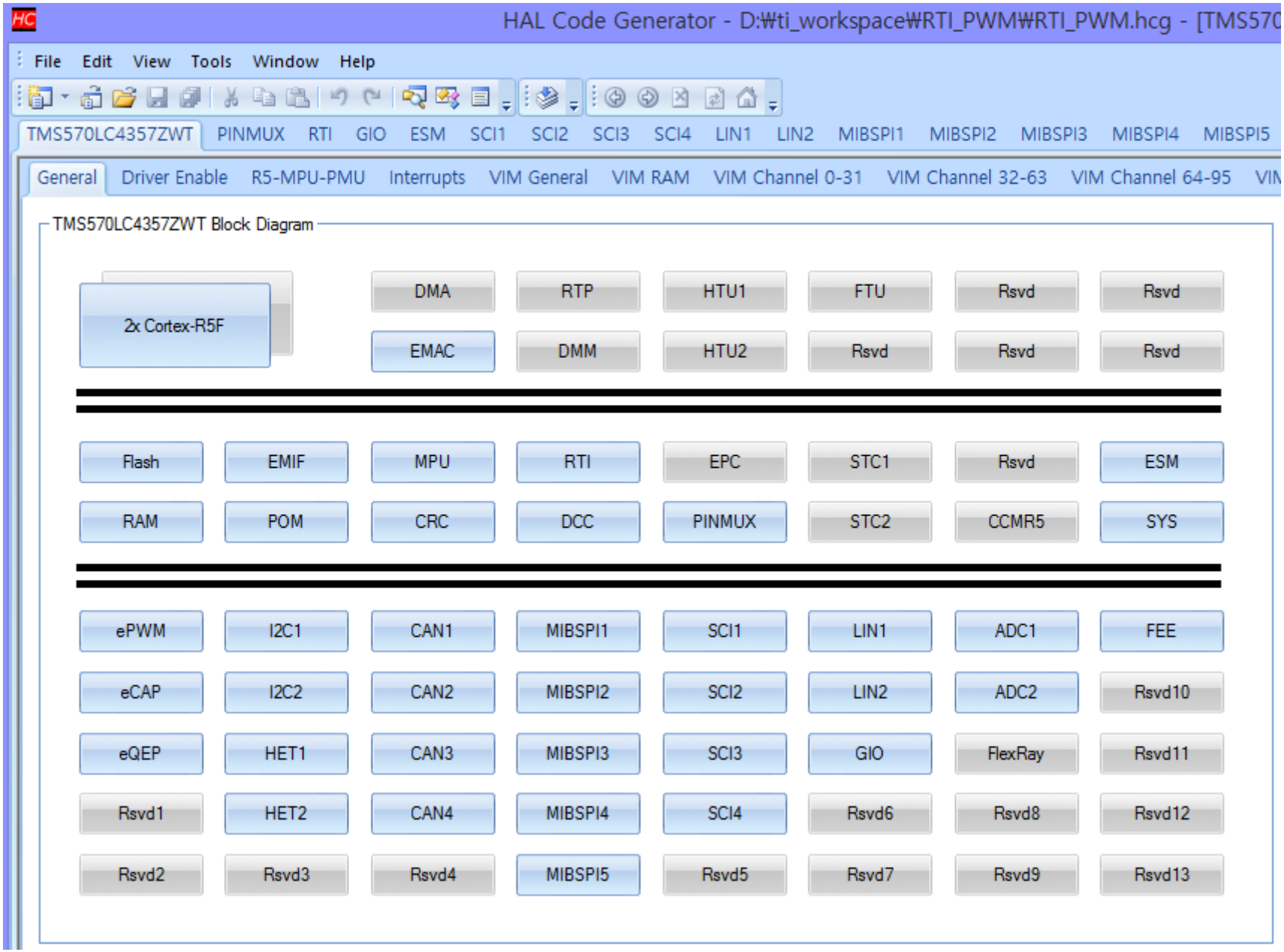


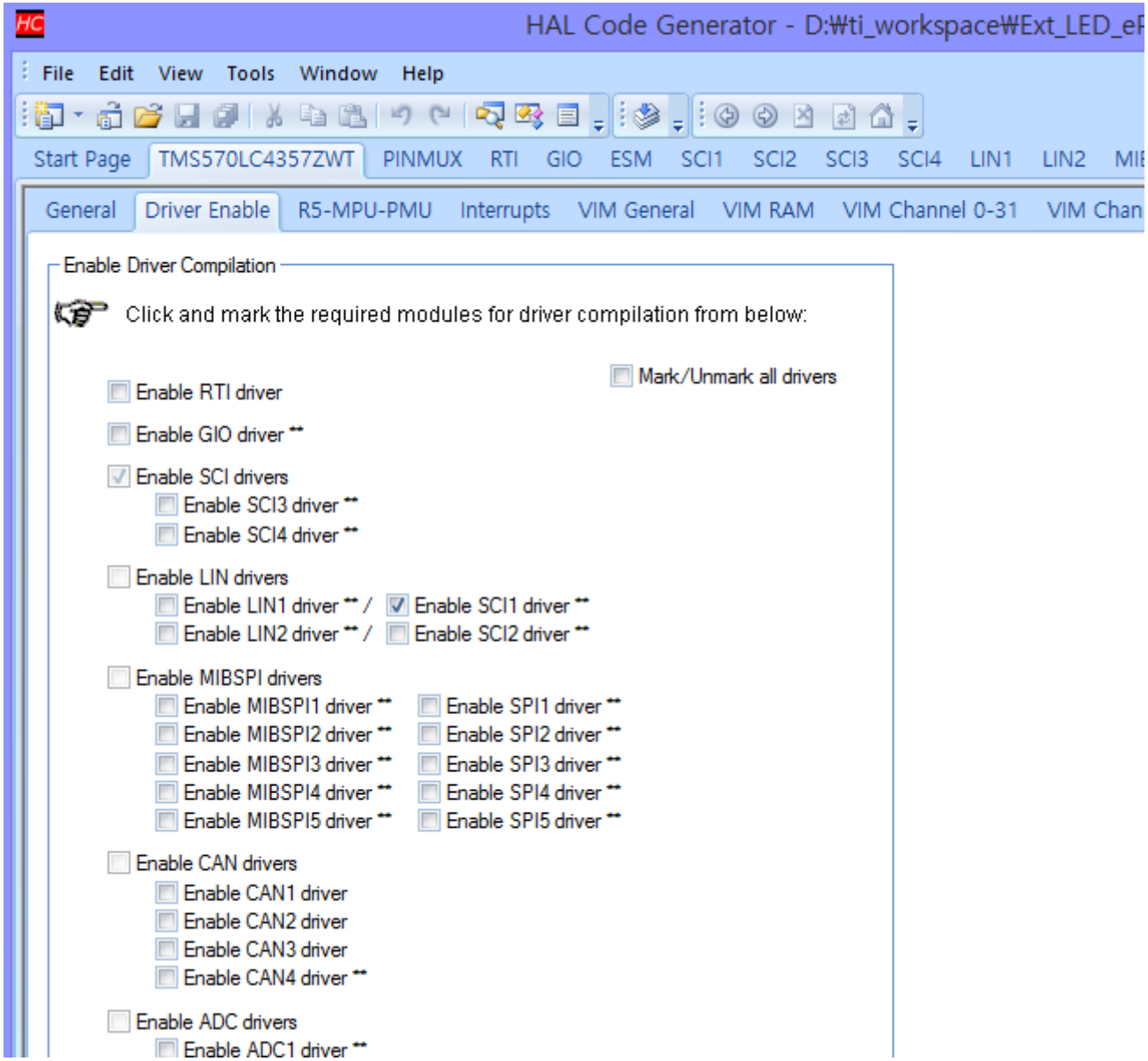

File Edit View Tools Window Help
Start Page
My.TI TI Home Microcontrollers
Texas Instruments
INNOVATE. CREATE. MAKE THE DIFFERENCE.™
HALCoGen
HALCoGen: 04.05.02 - Released 02.Mar.2016
Important Hercules Safety MCU Links:
Hercules product web pages provide access to device data sheets,technical reference manuals, application notes, videos, software downloads/updates, and online ordering of evaluation and development kits.
HALCoGen Wiki Page
Hercules Product Main Home Page
RM4 Product Home Page
TMS570 Product Home Page
TMS470M Product Home
Hercules Technical Support Forum
Search for topics or ask technical questions about all Hercules MCUs - RM4, TMS570 and TMS470M
Hercules MCU Wiki Site
Download development kit schematics, software examples, training videos and information and much more on the Hercules WIKI pages.
3rd Party Links
FreeRTOS Home
Keil Application Note on how use HALCoGen generated code in &microVision
IAR Application Note on how use HALCoGen generated code in IAR Embedded Workbench
ARM Cortex-R4F Technical Technical Reference Manual
Open Source
HALCoGen Manifest
Open Source Information and Download

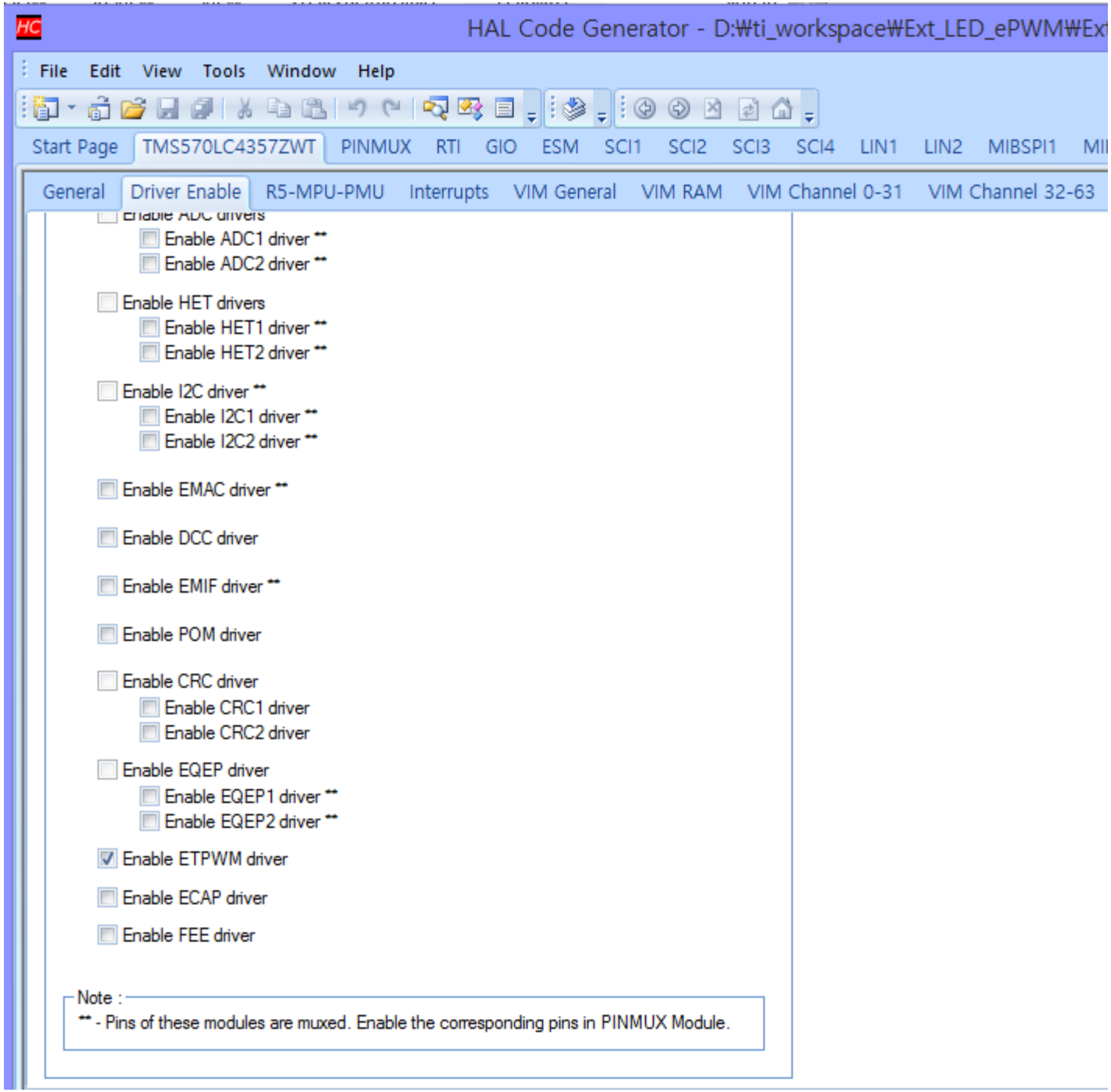

HAL Code Generator - - [TMS570LC4357ZWT]
File
Edit
View
Tools
Window
Help
New
Open
Close
Import DIL File...
Save Project
Close Project
Save All
Generate Code F5
Recent Files
Recent Projects
Exit
Project...
File... Ctrl+N
SCI1 SCI2 SCI3 SCI4 LIN1 LIN2 MIBSPI1 MIBSPI2 MIBSPI3 MIBSPI4 MIBSPI5
5-MPU-PMU Interrupts VIM General VIM RAM VIM Channel 0-31 VIM Channel 32-63 VIM Channel 64-95
Diagram
DMA RTP HTU1 FTU Rsvd Rsvd
EMAC DMM HTU2 Rsvd Rsvd Rsvd
EMIF MPU RTI EPC STC1 Rsvd ESM
RAM POM CRC DCC PINMUX STC2 CCMR5 SYS
ePWM I2C1 CAN1 MIBSPI1 SCI1 LIN1 ADC1 FEE
eCAP I2C2 CAN2 MIBSPI2 SCI2 LIN2 ADC2 Rsvd10
eQEP HET1 CAN3 MIBSPI3 SCI3 GIO FlexRay Rsvd11
Rsvd1 HET2 CAN4 MIBSPI4 SCI4 Rsvd6 Rsvd8 Rsvd12
Rsvd2 Rsvd3 Rsvd4 MIBSPI5 Rsvd5 Rsvd7 Rsvd9 Rsvd13

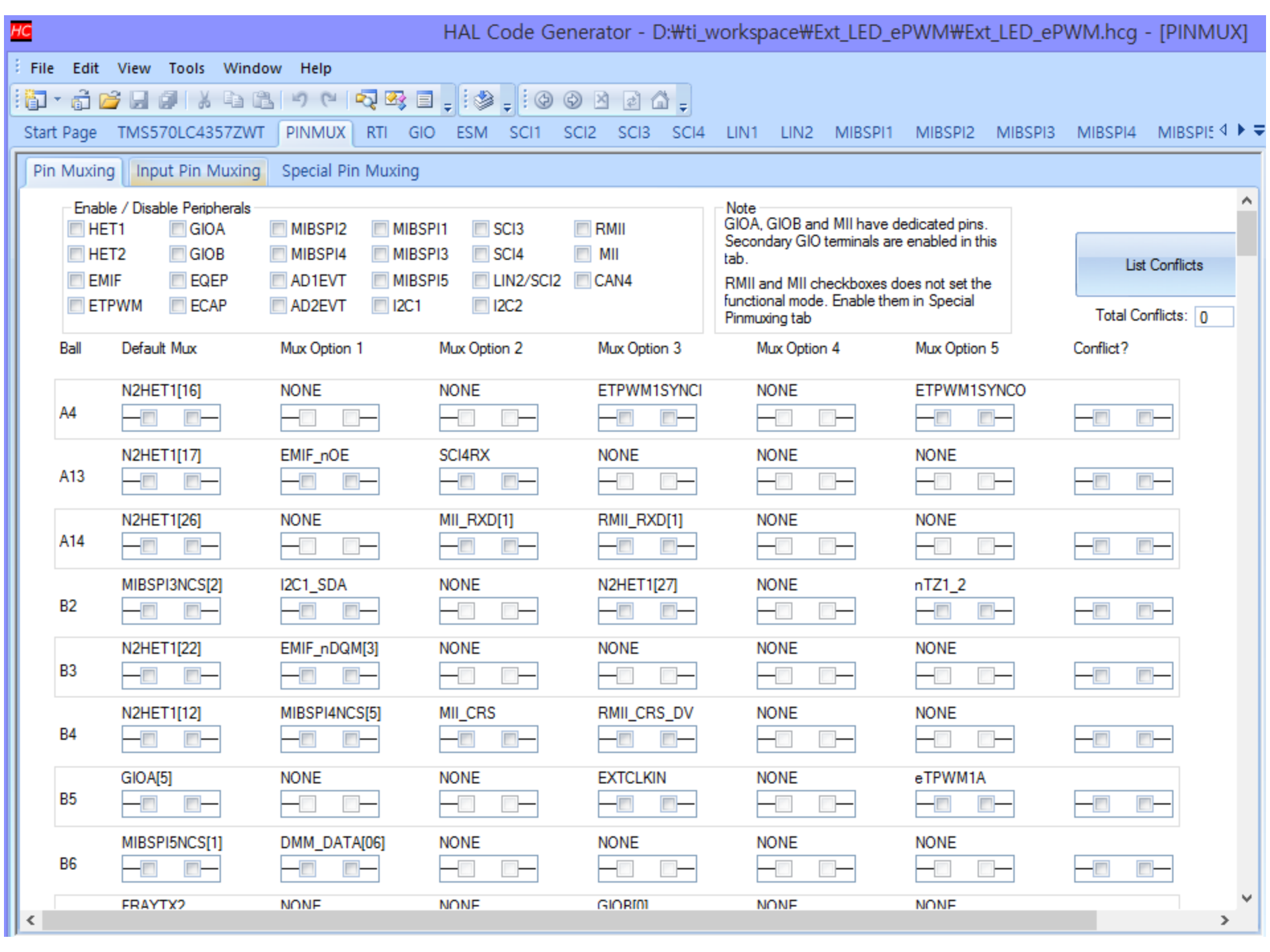

HAL Code Generator - - [TMS570LC4357ZWT]
File Edit View Tools Window Help
TMS570LC4357ZWT PINMUX RTI GIO ESM SCI1 SCI2 SCI3 SCI4 LIN1 LIN2 MIBSPI1 MIBSPI2 MIBSPI3 MIBSPI4 MIBSPI5
General Driver Enable R5-MPU-PMU Interrupts VIM General VIM RAM VIM Channel 0-31 VIM Channel 32-63 VIM Channel 64-95
TMS570LC4357ZWT Block Diagram
2x Cortex-R5F
DMA
EMAC
Flash
EMIF
MPU
RAM
POM
CRC
ePWM
I2C1
CAN1
eCAP
I2C2
CAN2
eQEP
HET1
CAN3
Rsvd1
HET2
CAN4
Rsvd2
Rsvd3
Rsvd4
New Project
Family:
TMS570LS04x
TMS570LS03x
TMS570LS02x
RM42x
RM41x
TMS570LS09x_07x
RM44x
TMS570LC43x
RM57Lx
Device:
TMS570LC4357ZWT
TMS570LC4357ZWT_FREERTOS
Name: Ext_LED_ePWM
Location: D:₩ti_workspace₩Ext_LED_ePWM
Create directory for project
Project will be created at: D:\ti_workspace\Ext_LED_ePWM.
Tools: Texas Instruments Tools
OK
Cancel

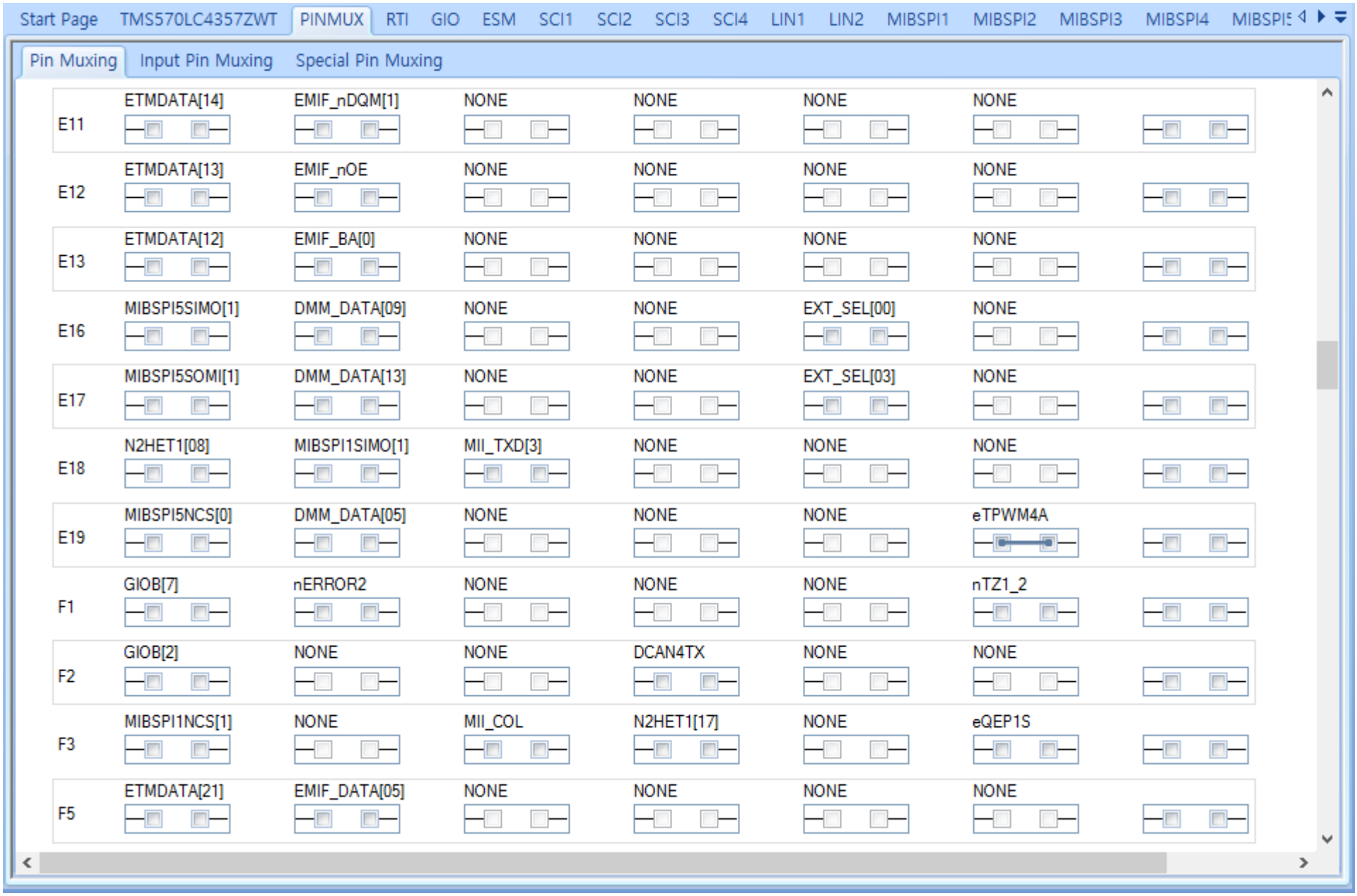
이번엔 PWM 을 활용하여 LED 를 제어해보도록 하자!

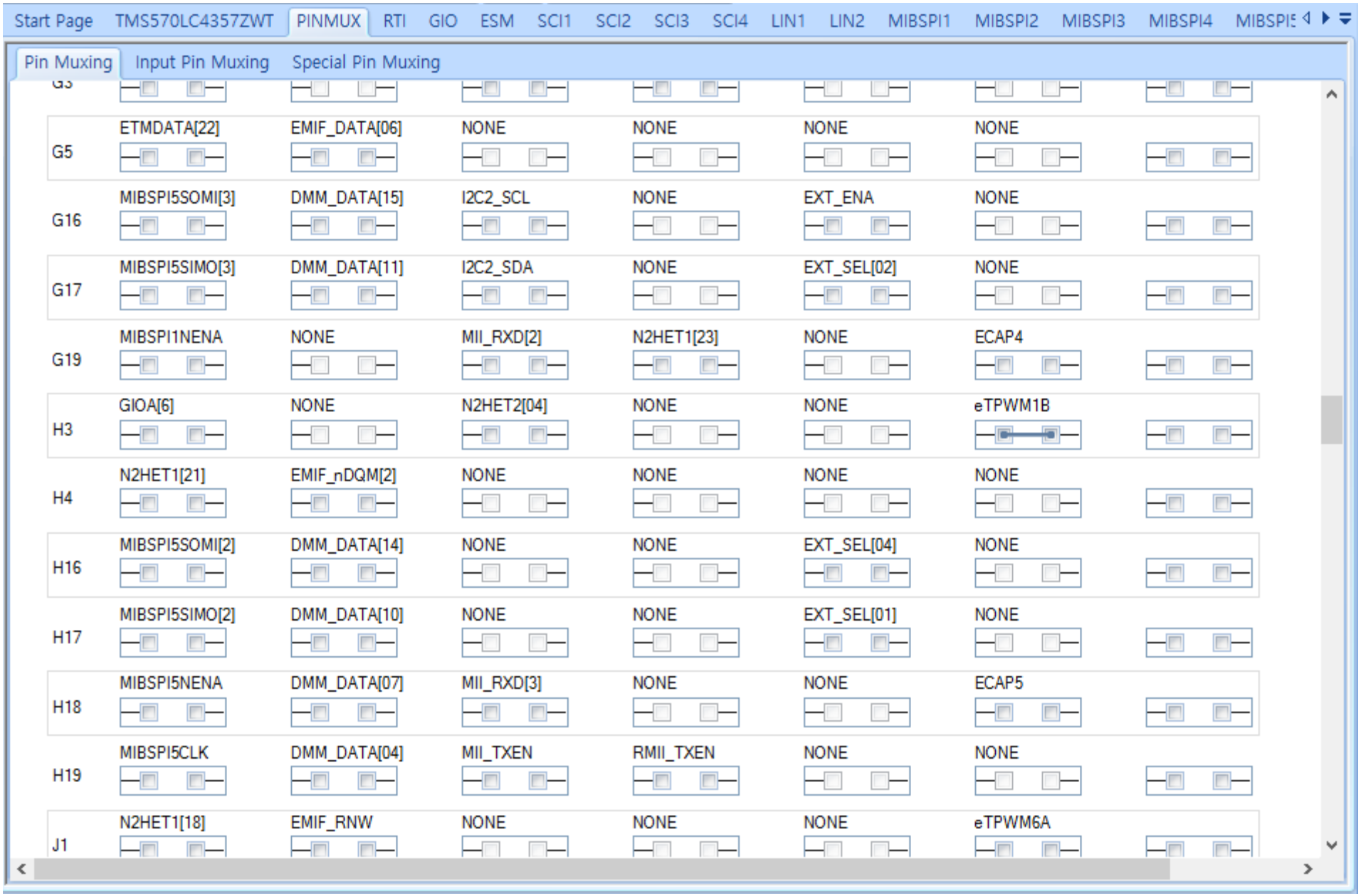


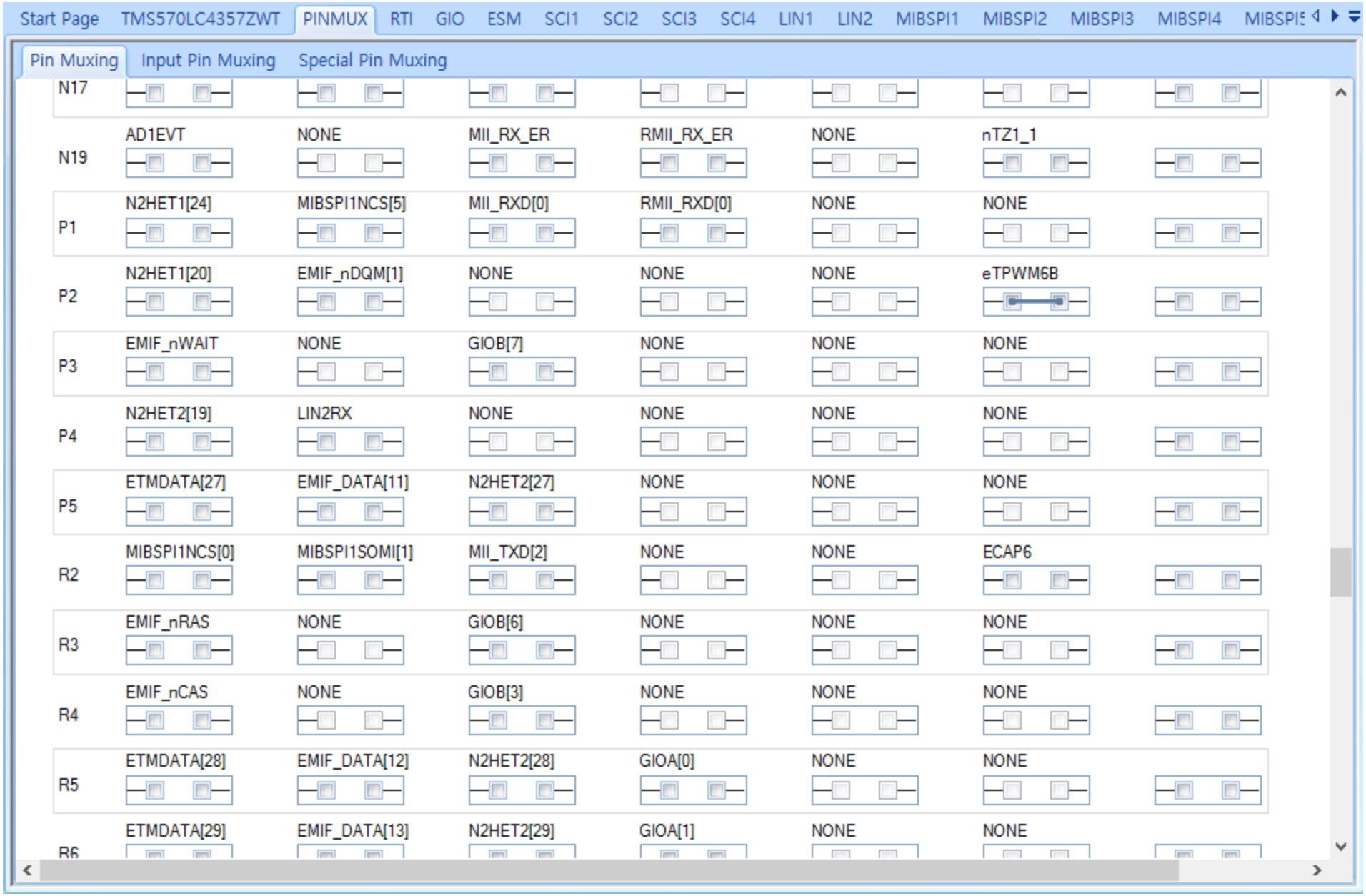

HAL Code Generator - D:₩ti_workspace₩Ext_LED_eP
File Edit View Tools Window Help
Start Page TMS570LC4357ZWT PINMUX RTI GIO ESM SCI1 SCI2 SCI3 SCI4 LIN1 LIN2 MIB
General Driver Enable R5-MPU-PMU Interrupts VIM General VIM RAM VIM Channel 0-31 VIM Chan
Enable Driver Compilation
Click and mark the required modules for driver compilation from below:
Mark/Unmark all drivers
Enable RTI driver
Enable GIO driver **
Enable SCI drivers
Enable SCI3 driver **
Enable SCI4 driver **
Enable LIN drivers
Enable LIN1 driver ** / Enable SCI1 driver **
Enable LIN2 driver ** / Enable SCI2 driver **
Enable MIBSPI drivers
Enable MIBSPI1 driver ** Enable SPI1 driver **
Enable MIBSPI2 driver ** Enable SPI2 driver **
Enable MIBSPI3 driver ** Enable SPI3 driver **
Enable MIBSPI4 driver ** Enable SPI4 driver **
Enable MIBSPI5 driver ** Enable SPI5 driver **
Enable CAN drivers
Enable CAN1 driver
Enable CAN2 driver
Enable CAN3 driver
Enable CAN4 driver **
Enable ADC drivers
Enable ADC1 driver **

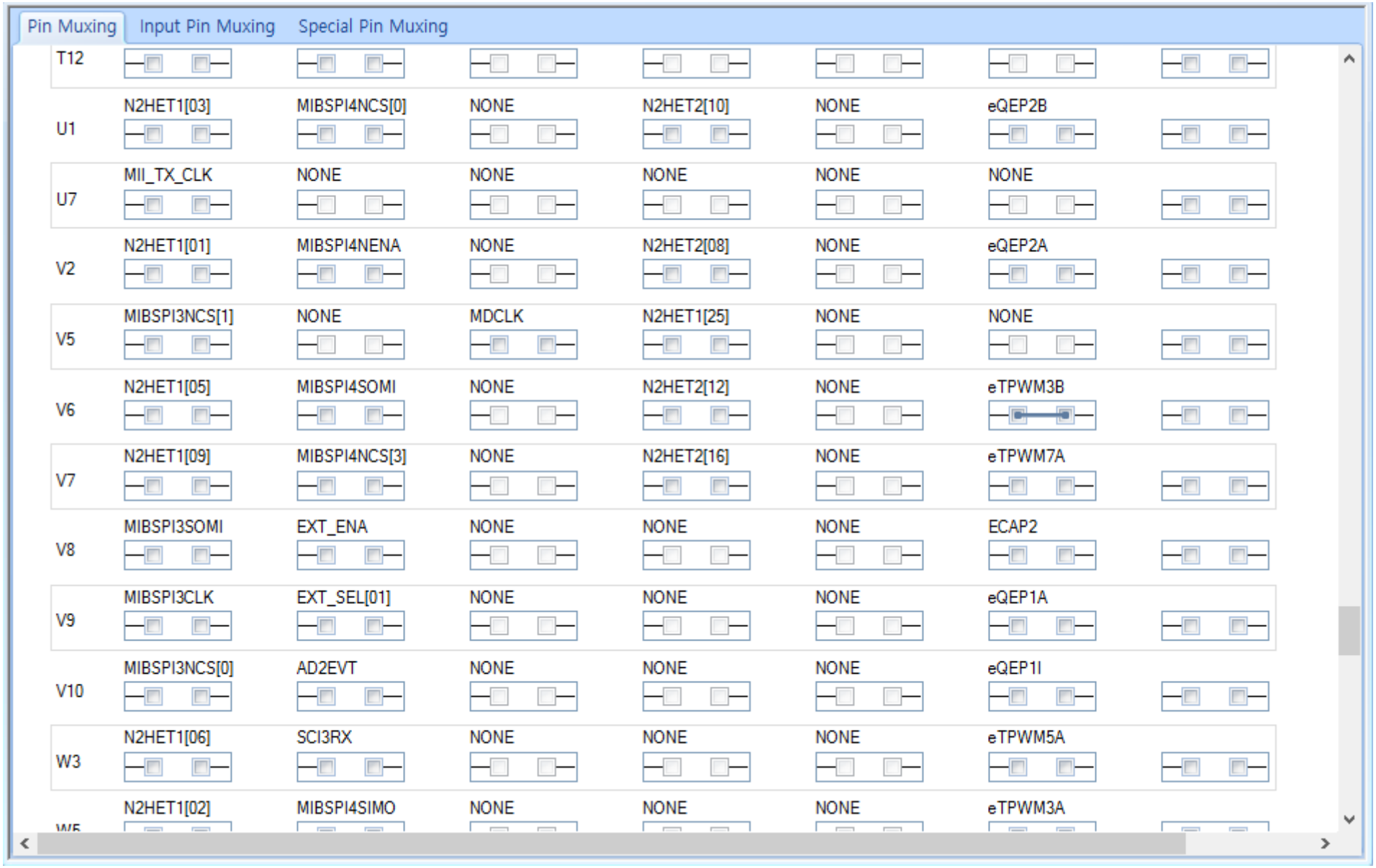

HAL Code Generator - D:₩ti_workspace₩Ext_LED_ePWM₩Ex
File Edit View Tools Window Help
Start Page TMS570LC4357ZWT PINMUX RTI GIO ESM SCI1 SCI2 SCI3 SCI4 LIN1 LIN2 MIBSPI1 MI
General Driver Enable R5-MPU-PMU Interrupts VIM General VIM RAM VIM Channel 0-31 VIM Channel 32-63
Enable ADC drivers
Enable ADC1 driver **
Enable ADC2 driver **
Enable HET drivers
Enable HET1 driver **
Enable HET2 driver **
Enable I2C driver **
Enable I2C1 driver **
Enable I2C2 driver **
Enable EMAC driver **
Enable DCC driver
Enable EMIF driver **
Enable POM driver
Enable CRC driver
Enable CRC1 driver
Enable CRC2 driver
Enable EQEP driver
Enable EQEP1 driver **
Enable EQEP2 driver **
Enable ETPWM driver
Enable ECAP driver
Enable FEE driver
Note :
** - Pins of these modules are muxed. Enable the corresponding pins in PINMUX Module.

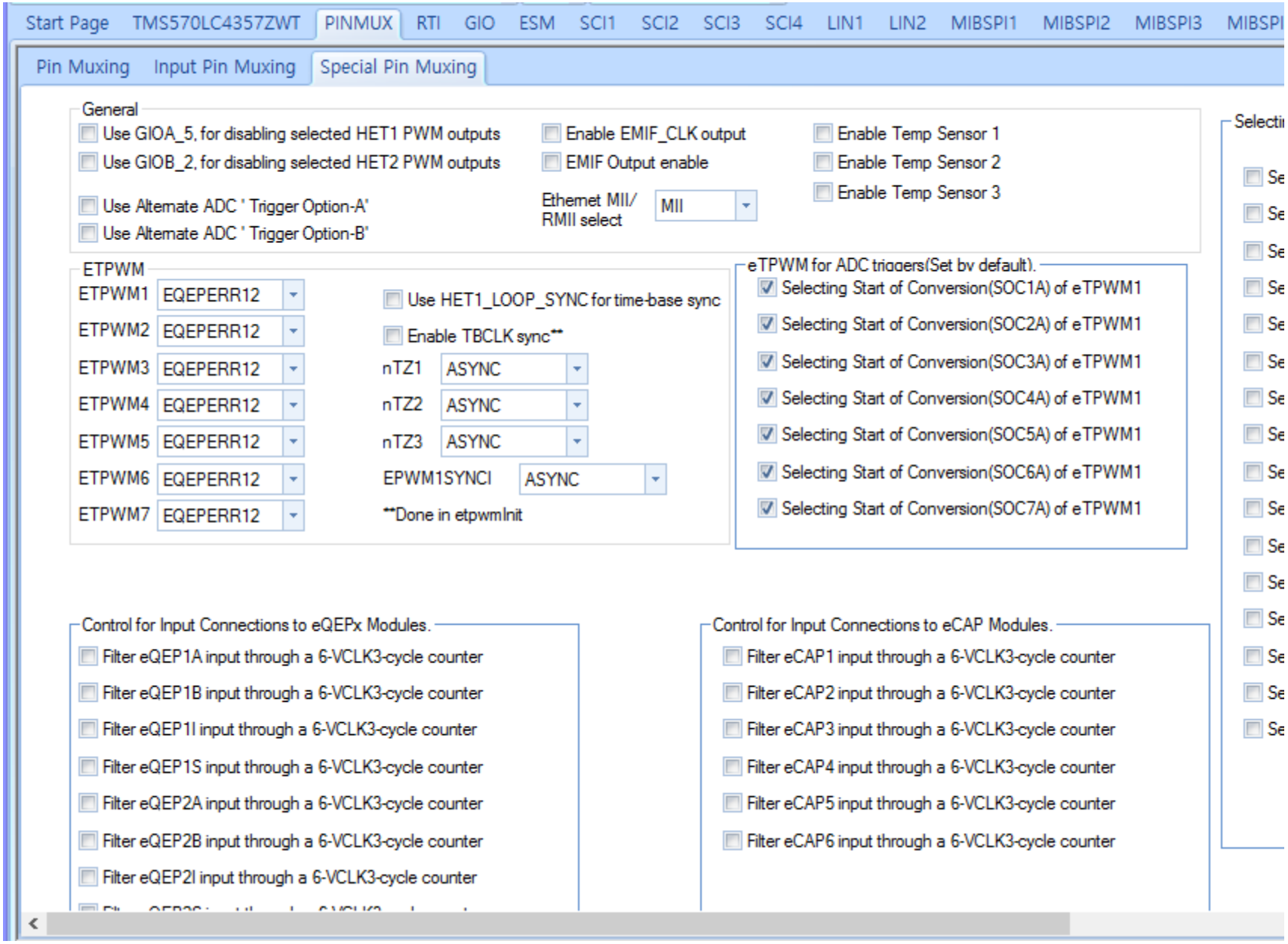

HAL Code Generator - D:₩ti_workspace₩Ext_LED_ePWM₩Ext_LED_ePWM.hcg - [PINMUX]
File Edit View Tools Window Help
Start Page TMS570LC4357ZWT PINMUX RTI GIO ESM SCI1 SCI2 SCI3 SCI4 LIN1 LIN2 MIBSPI1 MIBSPI2 MIBSPI3 MIBSPI4
Pin Muxing Input Pin Muxing Special Pin Muxing
Enable / Disable Peripherals
HET1 HET2 EMIF ETPWM
GIOA GIOB EQEP ECAP
MIBSPI2 MIBSPI4 AD1EVT AD2EVT
MIBSPI1 MIBSPI3 MIBSPI5 I2C1
SCI3 SCI4 LIN2/SCI2 I2C2
RMII MII CAN4
Note
GIOA, GIOB and MII have dedicated pins. Secondary GIO terminals are enabled in this tab.
RMII and MII checkboxes does not set the functional mode. Enable them in Special Pinmuxing tab
List Conflicts
Total Conflicts: 0
Ball Default Mux Mux Option 1 Mux Option 2 Mux Option 3 Mux Option 4 Mux Option 5 Conflict?
A4 N2HET1[16] NONE NONE ETPWM1SYNCI NONE ETPWM1SYNCO
A13 N2HET1[17] EMIF_nOE SCI4RX NONE NONE NONE
A14 N2HET1[26] NONE MII_RXD[1] RMII_RXD[1] NONE NONE
B2 MIBSPI3NCS[2] I2C1_SDA NONE N2HET1[27] NONE nTZ1_2
B3 N2HET1[22] EMIF_nDQM[3] NONE NONE NONE NONE
B4 N2HET1[12] MIBSPI4NCS[5] MII_CRS RMII_CRS_DV NONE NONE
B5 GIOA[5] NONE NONE EXTCLKIN NONE eTPWM1A
B6 MIBSPI5NCS[1] DMM_DATA[06] NONE NONE NONE NONE

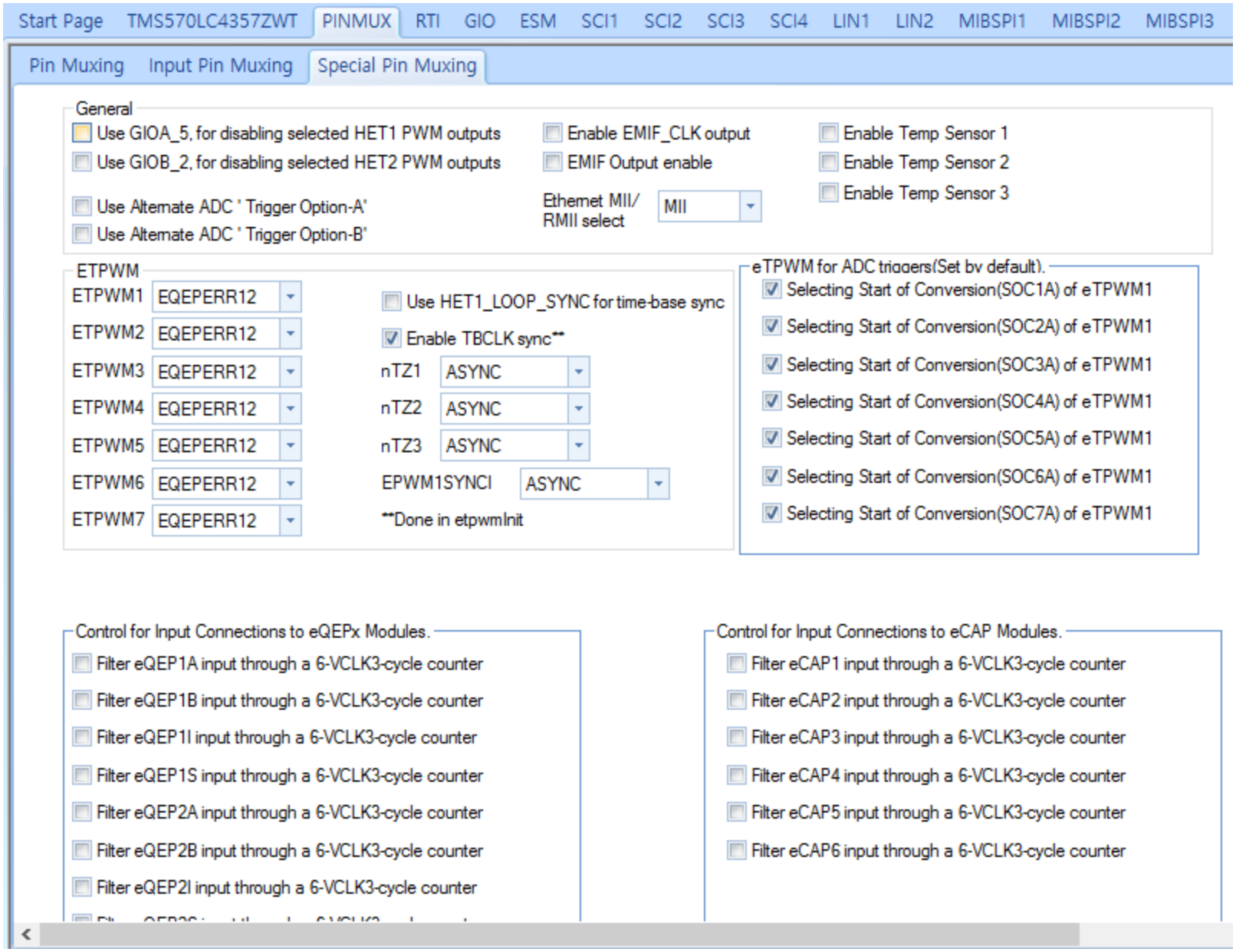

Start Page
TMS570LC4357ZWT
PINMUX
RTI
GIO
ESM
SCI1
SCI2
SCI3
SCI4
LIN1
LIN2
MIBSPI1
MIBSPI2
MIBSPI3
MIBSPI4
Pin Muxing
Input Pin Muxing
Special Pin Muxing
E11 ETMDATA[14] EMIF_nDQM[1] NONE NONE NONE NONE
E12 ETMDATA[13] EMIF_nOE NONE NONE NONE NONE
E13 ETMDATA[12] EMIF_BA[0] NONE NONE NONE NONE
E16 MIBSPI5SIMO[1] DMM_DATA[09] NONE NONE EXT_SEL[00] NONE
E17 MIBSPI5SOMI[1] DMM_DATA[13] NONE NONE EXT_SEL[03] NONE
E18 N2HET1[08] MIBSPI1SIMO[1] MII_TXD[3] NONE NONE NONE
E19 MIBSPI5NCS[0] DMM_DATA[05] NONE NONE NONE eTPWM4A
F1 GIOB[7] nERROR2 NONE NONE NONE nTZ1_2
F2 GIOB[2] NONE NONE DCAN4TX NONE NONE
F3 MIBSPI1NCS[1] NONE MII_COL N2HET1[17] NONE eQEP1S
F5 ETMDATA[21] EMIF_DATA[05] NONE NONE NONE NONE


Start Page
TMS570LC4357ZWT
PINMUX
RTI
GIO
ESM
SCI1
SCI2
SCI3
SCI4
LIN1
LIN2
MIBSPI1
MIBSPI2
MIBSPI3
MIBSPI4
Pin Muxing
Input Pin Muxing
Special Pin Muxing
G5 ETMDATA[22] EMIF_DATA[06] NONE NONE NONE NONE
G16 MIBSPI5SOMI[3] DMM_DATA[15] I2C2_SCL NONE EXT_ENA NONE
G17 MIBSPI5SIMO[3] DMM_DATA[11] I2C2_SDA NONE EXT_SEL[02] NONE
G19 MIBSPI1NENA NONE MII_RXD[2] N2HET1[23] NONE ECAP4
H3 GIOA[6] NONE N2HET2[04] NONE NONE eTPWM1B
H4 N2HET1[21] EMIF_nDQM[2] NONE NONE NONE NONE
H16 MIBSPI5SOMI[2] DMM_DATA[14] NONE NONE EXT_SEL[04] NONE
H17 MIBSPI5SIMO[2] DMM_DATA[10] NONE NONE EXT_SEL[01] NONE
H18 MIBSPI5NENA DMM_DATA[07] MII_RXD[3] NONE NONE ECAP5
H19 MIBSPI5CLK DMM_DATA[04] MII_TXEN RMII_TXEN NONE NONE
J1 N2HET1[18] EMIF_RNW NONE NONE NONE eTPWM6A

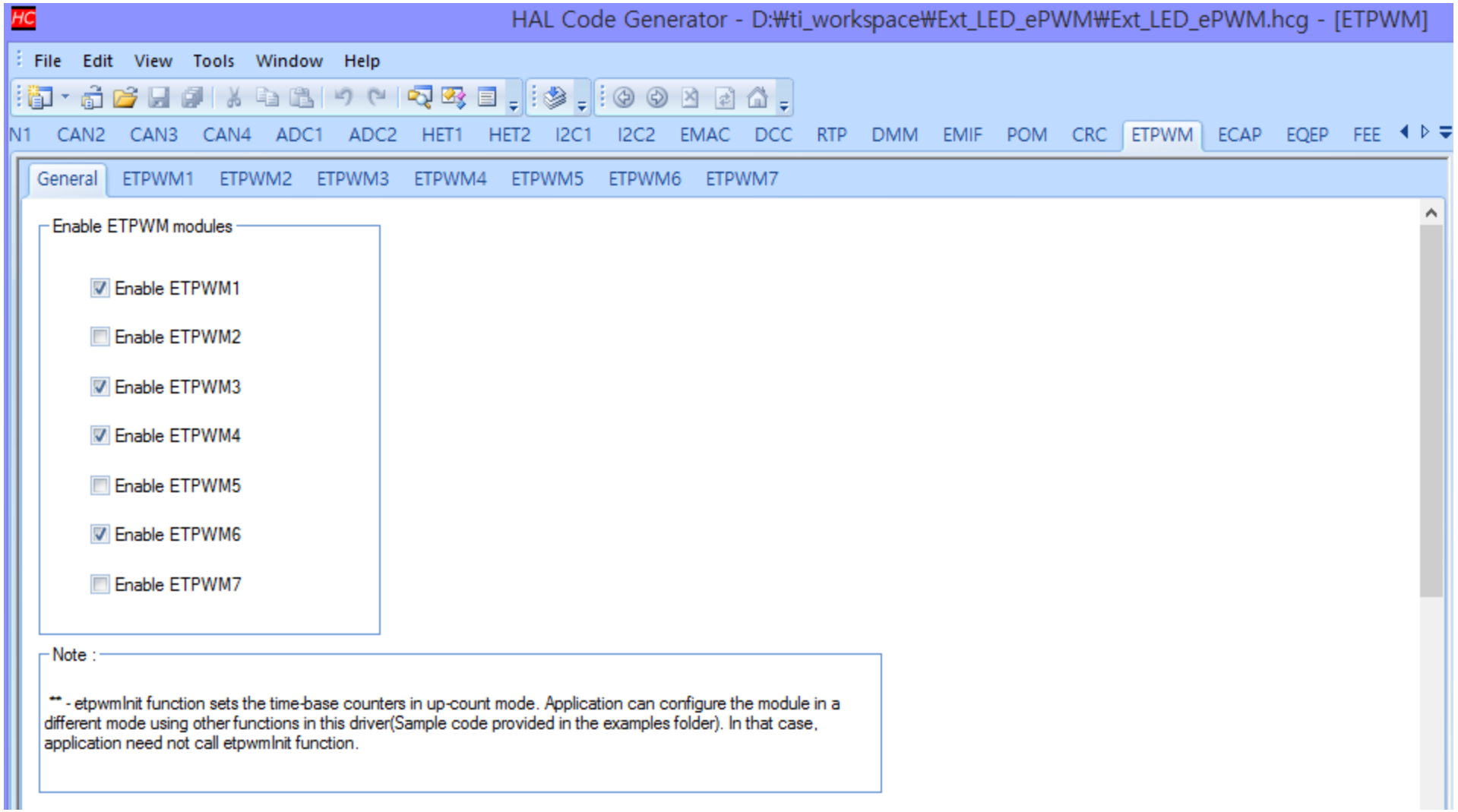

Start Page
TMS570LC4357ZWT
PINMUX
RTI
GIO
ESM
SCI1
SCI2
SCI3
SCI4
LIN1
LIN2
MIBSPI1
MIBSPI2
MIBSPI3
MIBSPI4
Pin Muxing
Input Pin Muxing
Special Pin Muxing
N17
AD1EVT NONE MII_RX_ER RMII_RX_ER NONE nTZ1_1
N19
N2HET1[24] MIBSPI1NCS[5] MII_RXD[0] RMII_RXD[0] NONE NONE
P1
N2HET1[20] EMIF_nDQM[1] NONE NONE NONE eTPWM6B
P2
EMIF_nWAIT NONE GIOB[7] NONE NONE NONE
P3
N2HET2[19] LIN2RX NONE NONE NONE NONE
P4
ETMDATA[27] EMIF_DATA[11] N2HET2[27] NONE NONE NONE
P5
MIBSPI1NCS[0] MIBSPI1SOMI[1] MII_TXD[2] NONE NONE ECAP6
R2
EMIF_nRAS NONE GIOB[6] NONE NONE NONE
R3
EMIF_nCAS NONE GIOB[3] NONE NONE NONE
R4
ETMDATA[28] EMIF_DATA[12] N2HET2[28] GIOA[0] NONE NONE
R5
ETMDATA[29] EMIF_DATA[13] N2HET2[29] GIOA[1] NONE NONE
R6

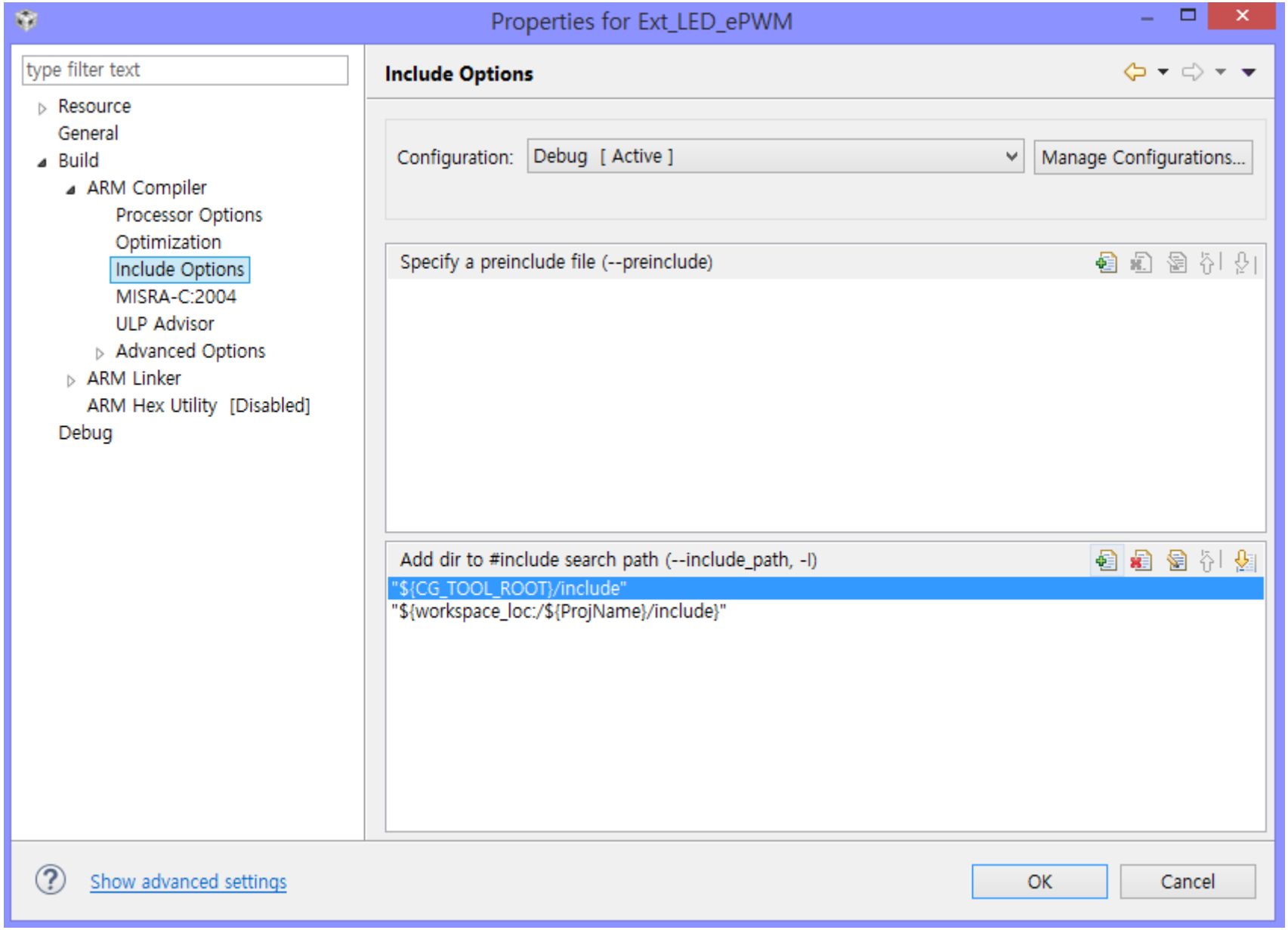

Pin Muxing
Input Pin Muxing
Special Pin Muxing
T12
U1 N2HET1[03] MIBSPI4NCS[0] NONE N2HET2[10] NONE eQEP2B
U7 MII_TX_CLK NONE NONE NONE NONE NONE
V2 N2HET1[01] MIBSPI4NENA NONE N2HET2[08] NONE eQEP2A
V5 MIBSPI3NCS[1] NONE MDCLK N2HET1[25] NONE NONE
V6 N2HET1[05] MIBSPI4SOMI NONE N2HET2[12] NONE eTPWM3B
V7 N2HET1[09] MIBSPI4NCS[3] NONE N2HET2[16] NONE eTPWM7A
V8 MIBSPI3SOMI EXT_ENA NONE NONE NONE ECAP2
V9 MIBSPI3CLK EXT_SEL[01] NONE NONE NONE eQEP1A
V10 MIBSPI3NCS[0] AD2EVT NONE NONE NONE eQEP1I
W3 N2HET1[06] SCI3RX NONE NONE NONE eTPWM5A
N2HET1[02] MIBSPI4SIMO NONE NONE NONE eTPWM3A

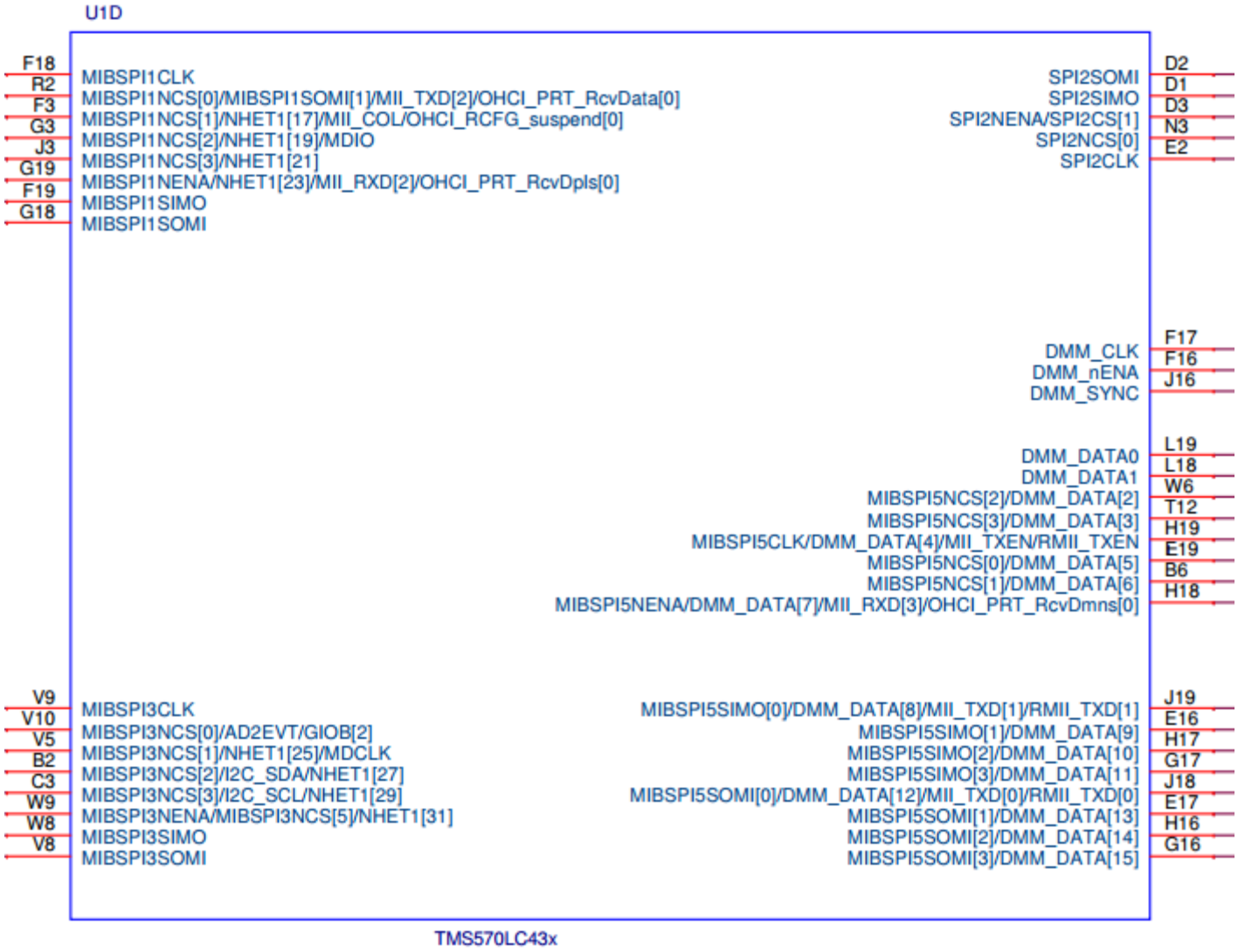

Start Page
TMS570LC4357ZWT
PINMUX
RTI
GIO
ESM
SCI1
SCI2
SCI3
SCI4
LIN1
LIN2
MIBSPI1
MIBSPI2
MIBSPI3
MIBSPI
Pin Muxing
Input Pin Muxing
Special Pin Muxing
General
Use GIOA_5, for disabling selected HET1 PWM outputs
Use GIOB_2, for disabling selected HET2 PWM outputs
Use Alternate ADC ' Trigger Option-A'
Use Alternate ADC ' Trigger Option-B'
Enable EMIF_CLK output
EMIF Output enable
Ethernet MII/ RMII select
MII
Enable Temp Sensor 1
Enable Temp Sensor 2
Enable Temp Sensor 3
ETPWM
ETPWM1 EQEPERR12
ETPWM2 EQEPERR12
ETPWM3 EQEPERR12
ETPWM4 EQEPERR12
ETPWM5 EQEPERR12
ETPWM6 EQEPERR12
ETPWM7 EQEPERR12
Use HET1_LOOP_SYNC for time-base sync
Enable TBCLK sync**
nTZ1 ASYNC
nTZ2 ASYNC
nTZ3 ASYNC
EPWM1SYNCI ASYNC
**Done in etpwmInit
eTPWM for ADC triggers(Set by default).
Selecting Start of Conversion(SOC1A) of eTPWM1
Selecting Start of Conversion(SOC2A) of eTPWM1
Selecting Start of Conversion(SOC3A) of eTPWM1
Selecting Start of Conversion(SOC4A) of eTPWM1
Selecting Start of Conversion(SOC5A) of eTPWM1
Selecting Start of Conversion(SOC6A) of eTPWM1
Selecting Start of Conversion(SOC7A) of eTPWM1
Control for Input Connections to eQEPx Modules.
Filter eQEP1A input through a 6-VCLK3-cycle counter
Filter eQEP1B input through a 6-VCLK3-cycle counter
Filter eQEP1I input through a 6-VCLK3-cycle counter
Filter eQEP1S input through a 6-VCLK3-cycle counter
Filter eQEP2A input through a 6-VCLK3-cycle counter
Filter eQEP2B input through a 6-VCLK3-cycle counter
Filter eQEP2I input through a 6-VCLK3-cycle counter
Control for Input Connections to eCAP Modules.
Filter eCAP1 input through a 6-VCLK3-cycle counter
Filter eCAP2 input through a 6-VCLK3-cycle counter
Filter eCAP3 input through a 6-VCLK3-cycle counter
Filter eCAP4 input through a 6-VCLK3-cycle counter
Filter eCAP5 input through a 6-VCLK3-cycle counter
Filter eCAP6 input through a 6-VCLK3-cycle counter

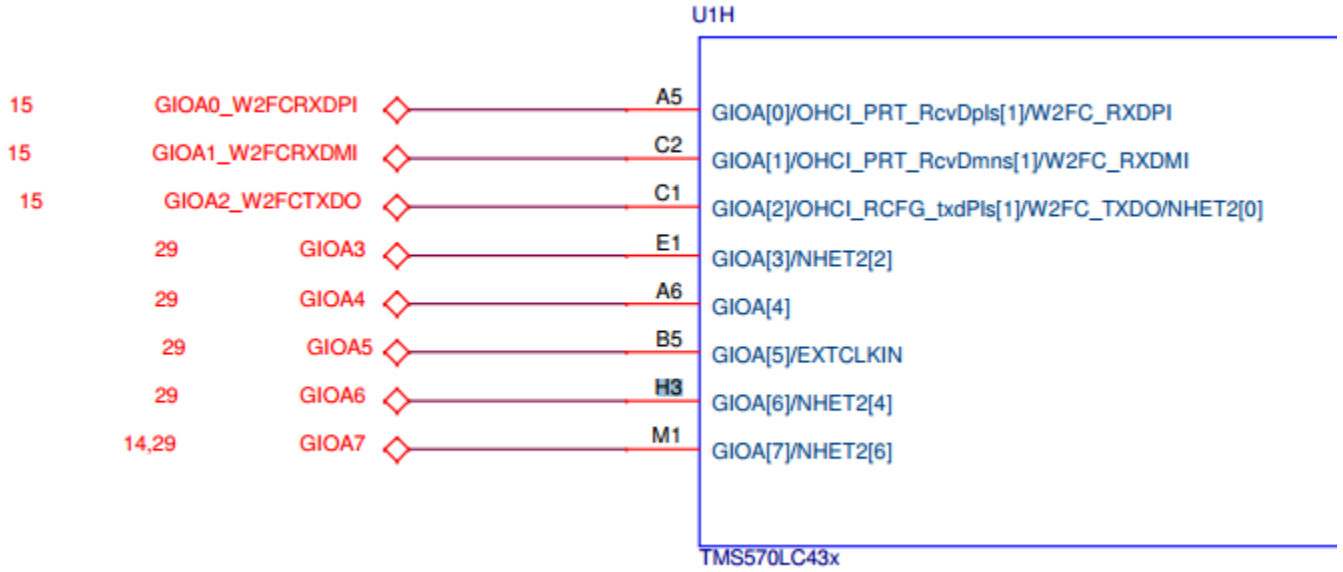

Start Page
TMS570LC4357ZWT
PINMUX
RTI
GIO
ESM
SCI1
SCI2
SCI3
SCI4
LIN1
LIN2
MIBSPI1
MIBSPI2
MIBSPI3
Pin Muxing
Input Pin Muxing
Special Pin Muxing
General
Use GIOA_5, for disabling selected HET1 PWM outputs
Use GIOB_2, for disabling selected HET2 PWM outputs
Use Alternate ADC ' Trigger Option-A'
Use Alternate ADC ' Trigger Option-B'
Enable EMIF_CLK output
EMIF Output enable
Ethernet MII/ RMII select
MII
Enable Temp Sensor 1
Enable Temp Sensor 2
Enable Temp Sensor 3
ETPWM
ETPWM1 EQEPERR12
ETPWM2 EQEPERR12
ETPWM3 EQEPERR12
ETPWM4 EQEPERR12
ETPWM5 EQEPERR12
ETPWM6 EQEPERR12
ETPWM7 EQEPERR12
Use HET1_LOOP_SYNC for time-base sync
Enable TBCLK sync**
nTZ1 ASYNC
nTZ2 ASYNC
nTZ3 ASYNC
EPWM1SYNCI ASYNC
**Done in etpwmInit
eTPWM for ADC triggers(Set by default).
Selecting Start of Conversion(SOC1A) of eTPWM1
Selecting Start of Conversion(SOC2A) of eTPWM1
Selecting Start of Conversion(SOC3A) of eTPWM1
Selecting Start of Conversion(SOC4A) of eTPWM1
Selecting Start of Conversion(SOC5A) of eTPWM1
Selecting Start of Conversion(SOC6A) of eTPWM1
Selecting Start of Conversion(SOC7A) of eTPWM1
Control for Input Connections to eQEPx Modules.
Filter eQEP1A input through a 6-VCLK3-cycle counter
Filter eQEP1B input through a 6-VCLK3-cycle counter
Filter eQEP1I input through a 6-VCLK3-cycle counter
Filter eQEP1S input through a 6-VCLK3-cycle counter
Filter eQEP2A input through a 6-VCLK3-cycle counter
Filter eQEP2B input through a 6-VCLK3-cycle counter
Filter eQEP2I input through a 6-VCLK3-cycle counter
Control for Input Connections to eCAP Modules.
Filter eCAP1 input through a 6-VCLK3-cycle counter
Filter eCAP2 input through a 6-VCLK3-cycle counter
Filter eCAP3 input through a 6-VCLK3-cycle counter
Filter eCAP4 input through a 6-VCLK3-cycle counter
Filter eCAP5 input through a 6-VCLK3-cycle counter
Filter eCAP6 input through a 6-VCLK3-cycle counter

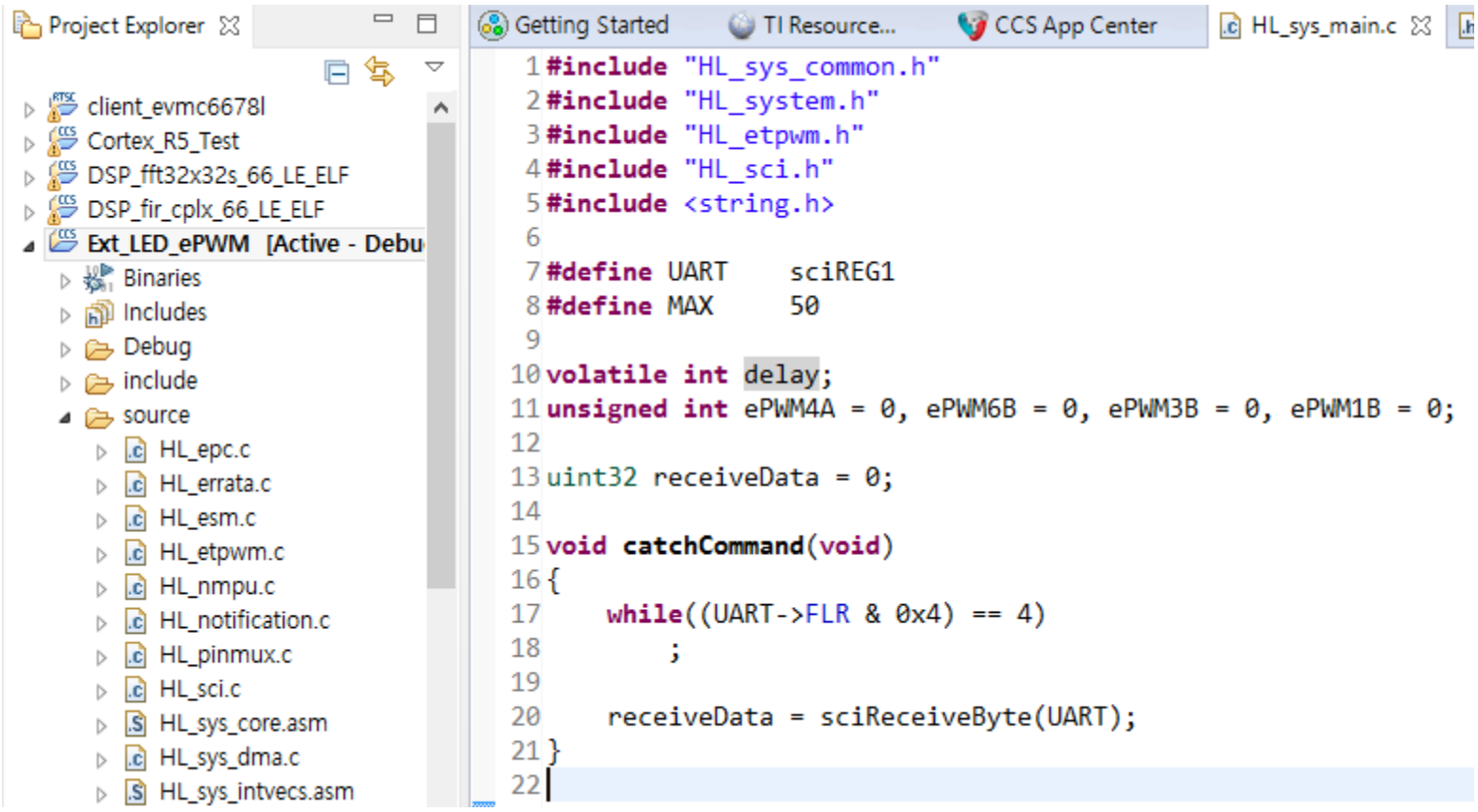

N1 CAN2 CAN3 CAN4 ADC1 ADC2 HET1 HET2 I2C1 I2C2 EMAC DCC RTP DMM EMIF POM CRC ETPWM ECAP EQEP FEE
General ETPWM1 ETPWM2 ETPWM3 ETPWM4 ETPWM5 ETPWM6 ETPWM7
Enable ETPWM modules
Enable ETPWM1
Enable ETPWM2
Enable ETPWM3
Enable ETPWM4
Enable ETPWM5
Enable ETPWM6
Enable ETPWM7
Note :
** - etpwmInit function sets the time-base counters in up-count mode. Application can configure the module in a different mode using other functions in this driver(Sample code provided in the examples folder). In that case, application need not call etpwmInit function.


HAL Code Generator - D:₩ti_workspace₩Ext_LED_ePWM₩Ext_LED_ePWM.hcg - [ETPWM]
File Edit View Tools Window Help
N1 CAN2 CAN3 CAN4 ADC1 ADC2 HET1 HET2 I2C1 I2C2 EMAC DCC RTP DMM EMIF POM CRC ETPWM ECAP EQEP FEE
General ETPWM1 ETPWM2 ETPWM3 ETPWM4 ETPWM5 ETPWM6 ETPWM7
Enable ETPWM modules
Enable ETPWM1
Enable ETPWM2
Enable ETPWM3
Enable ETPWM4
Enable ETPWM5
Enable ETPWM6
Enable ETPWM7
Note :
** - etpwmInit function sets the time-base counters in up-count mode. Application can configure the module in a different mode using other functions in this driver(Sample code provided in the examples folder). In that case, application need not call etpwmInit function.


Properties for Ext_LED_ePWM
type filter text
Resource
General
Build
ARM Compiler
Processor Options
Optimization
Include Options
MISRA-C:2004
ULP Advisor
Advanced Options
ARM Linker
ARM Hex Utility [Disabled]
Debug
Include Options
Configuration: Debug [Active]
Manage Configurations...
Specify a preinclude file (--preinclude)
Add dir to #include search path (--include_path, -I)
"${CG_TOOL_ROOT}/include"
"${workspace_loc:/${ProjName}/include}"
Show advanced settings
OK
Cancel


U1D
F18 MIBSPI1CLK
R2 MIBSPI1NCS[0]/MIBSPI1SOMI[1]/MII_TXD[2]/OHCI_PRT_RcvData[0]
F3 MIBSPI1NCS[1]/NHET1[17]/MII_COL/OHCI_RCFG_suspend[0]
G3 MIBSPI1NCS[2]/NHET1[19]/MDIO
J3 MIBSPI1NCS[3]/NHET1[21]
G19 MIBSPI1NENA/NHET1[23]/MII_RXD[2]/OHCI_PRT_RcvDpls[0]
F19 MIBSPI1SIMO
G18 MIBSPI1SOMI
SPI2SOMI D2
SPI2SIMO D1
SPI2NENA/SPI2CS[1] D3
SPI2NCS[0] N3
SPI2CLK E2
DMM_CLK F17
DMM_nENA F16
DMM_SYNC J16
DMM_DATA0 L19
DMM_DATA1 L18
MIBSPI5NCS[2]/DMM_DATA[2] W6
MIBSPI5NCS[3]/DMM_DATA[3] T12
MIBSPI5CLK/DMM_DATA[4]/MII_TXEN/RMII_TXEN H19
MIBSPI5NCS[0]/DMM_DATA[5] E19
MIBSPI5NCS[1]/DMM_DATA[6] B6
MIBSPI5NENA/DMM_DATA[7]/MII_RXD[3]/OHCI_PRT_RcvDmns[0] H18
V9 MIBSPI3CLK
V10 MIBSPI3NCS[0]/AD2EVT/GIOB[2]
V5 MIBSPI3NCS[1]/NHET1[25]/MDCLK
B2 MIBSPI3NCS[2]/I2C_SDA/NHET1[27]
C3 MIBSPI3NCS[3]/I2C_SCL/NHET1[29]
W9 MIBSPI3NENA/MIBSPI3NCS[5]/NHET1[31]
W8 MIBSPI3SIMO
V8 MIBSPI3SOMI
MIBSPI5SIMO[0]/DMM_DATA[8]/MII_TXD[1]/RMII_TXD[1] J19
MIBSPI5SIMO[1]/DMM_DATA[9] E16
MIBSPI5SIMO[2]/DMM_DATA[10] H17
MIBSPI5SIMO[3]/DMM_DATA[11] G17
MIBSPI5SOMI[0]/DMM_DATA[12]/MII_TXD[0]/RMII_TXD[0] J18
MIBSPI5SOMI[1]/DMM_DATA[13] E17
MIBSPI5SOMI[2]/DMM_DATA[14] H16
MIBSPI5SOMI[3]/DMM_DATA[15] G16
TMS570LC43x


U1H
15
GIOA0_W2FCRXDPI
A5
GIOA[0]/OHCI_PRT_RcvDpls[1]/W2FC_RXDPI
15
GIOA1_W2FCRXDMI
C2
GIOA[1]/OHCI_PRT_RcvDmns[1]/W2FC_RXDMI
15
GIOA2_W2FCTXDO
C1
GIOA[2]/OHCI_RCFG_txdPls[1]/W2FC_TXDO/NHET2[0]
29
GIOA3
E1
GIOA[3]/NHET2[2]
29
GIOA4
A6
GIOA[4]
29
GIOA5
B5
GIOA[5]/EXTCLKIN
29
GIOA6
H3
GIOA[6]/NHET2[4]
14,29
GIOA7
M1
GIOA[7]/NHET2[6]
TMS570LC43x


Project Explorer
client_evmc6678l
Cortex_R5_Test
DSP_fft32x32s_66_LE_ELF
DSP_fir_cplx_66_LE_ELF
Ext_LED_ePWM [Active - Debu
Binaries
Includes
Debug
include
source
HL_epc.c
HL_errata.c
HL_esm.c
HL_etpwm.c
HL_nmpu.c
HL_notification.c
HL_pinmux.c
HL_sci.c
HL_sys_core.asm
HL_sys_dma.c
HL_sys_intvecs.asm
Getting Started
TI Resource...
CCS App Center
HL_sys_main.c
1 #include "HL_sys_common.h"
2 #include "HL_system.h"
3 #include "HL_etpwm.h"
4 #include "HL_sci.h"
5 #include <string.h>
6
7 #define UART sciREG1
8 #define MAX 50
9
10 volatile int delay;
11 unsigned int ePWM4A = 0, ePWM6B = 0, ePWM3B = 0, ePWM1B = 0;
12
13 uint32 receiveData = 0;
14
15 void catchCommand(void)
16 {
17 while((UART->FLR & 0x4) == 4)
18 ;
19
20 receiveData = sciReceiveByte(UART);
21 }
22

```c
void main(void)
{
    int flag = 0;
    int temp = MAX;

    sciInit();
    etpwmInit();

    for(;;)
    {
        etpwmStartTBCLK();

        if((UART->FLR & 0x200) == 0 && flag == 0)
        {
            for(delay = 0; delay < 100000; delay++)
                ;

            if(ePWM4A >= (temp + 50))
                ePWM4A = 0;
            else
                ePWM4A++;

            etpwmSetCmpA(etpwmREG4, ePWM4A);

            for(delay = 0; delay < 100000; delay++)
                ;

            if(ePWM6B >= (temp + 30))
                ePWM6B = 0;
            else
                ePWM6B++;
```

```
54
55              etpwmSetCmpB(etpwmREG6, ePWM6B);
56
57              for(delay = 0; delay < 100000; delay++)
58                  ;
59
60              if(ePWM3B >= (temp - 10))
61                  ePWM3B = 0;
62              else
63                  ePWM3B++;
64
65              etpwmSetCmpB(etpwmREG3, ePWM3B);
66
67              for(delay = 0; delay < 100000; delay++)
68                  ;
69
70              if(ePWM1B >= (temp + 60))
71              {
72                  for(delay = 0; delay < 100000; delay++)
73                                  ;
74
75                  ePWM1B = 0;
76              }
77              else
78                  ePWM1B++;
79
80              etpwmSetCmpB(etpwmREG1, ePWM1B);
81          }
```

```
82          else if((UART->FLR & 0x200) == 0 && flag == 1)
83          {
84              for(delay = 0; delay < 100000; delay++)
85                  ;
86
87              if(ePWM4A >= temp)
88                  ePWM4A = 0;
89              else
90                  ePWM4A++;
91
92              etpwmSetCmpA(etpwmREG4, ePWM4A);
93
94              for(delay = 0; delay < 100000; delay++)
95                  ;
96
97              if(ePWM6B >= temp)
98                  ePWM6B = 0;
99              else
100                 ePWM6B++;
101
102             etpwmSetCmpB(etpwmREG6, ePWM6B);
103
104             for(delay = 0; delay < 100000; delay++)
105                 ;
106
107             if(ePWM3B >= temp)
108                 ePWM3B = 0;
109             else
110                 ePWM3B++;
111
112             etpwmSetCmpB(etpwmREG3, ePWM3B);
```

```
113
114             for(delay = 0; delay < 100000; delay++)
115                 ;
116
117             if(ePWM1B >= temp)
118                 ePWM1B = 0;
119             else
120                 ePWM1B++;
121
122             etpwmSetCmpB(etpwmREG1, ePWM1B);
123         }
124         else
125         {
126             catchCommand();
127
128             if (receiveData == 53)
129             {
130                 flag = 1;
131                 ePWM4A = temp-20;
132                 ePWM6B = temp-20;
133                 ePWM3B = temp-20;
134                 ePWM1B = temp-20;
135             }
136             else if (receiveData == 48)
137             {
138                 flag = 0;
139                 ePWM4A = 0;
140                 ePWM6B = 0;
141                 ePWM3B = 0;
142                 ePWM1B = 0;
143             }
144         }
145
146         etpwmStopTBCLK();
147     }
148 }
```

테라텀이나 하이퍼터미널을 활용해서 UART 통신을 수행할 수 있다.

숫자 5에 해당하는 부분

숫자 0에 해당하는 부분