EDDI
Electronic Design
Development Institute

에디로봇아카데미

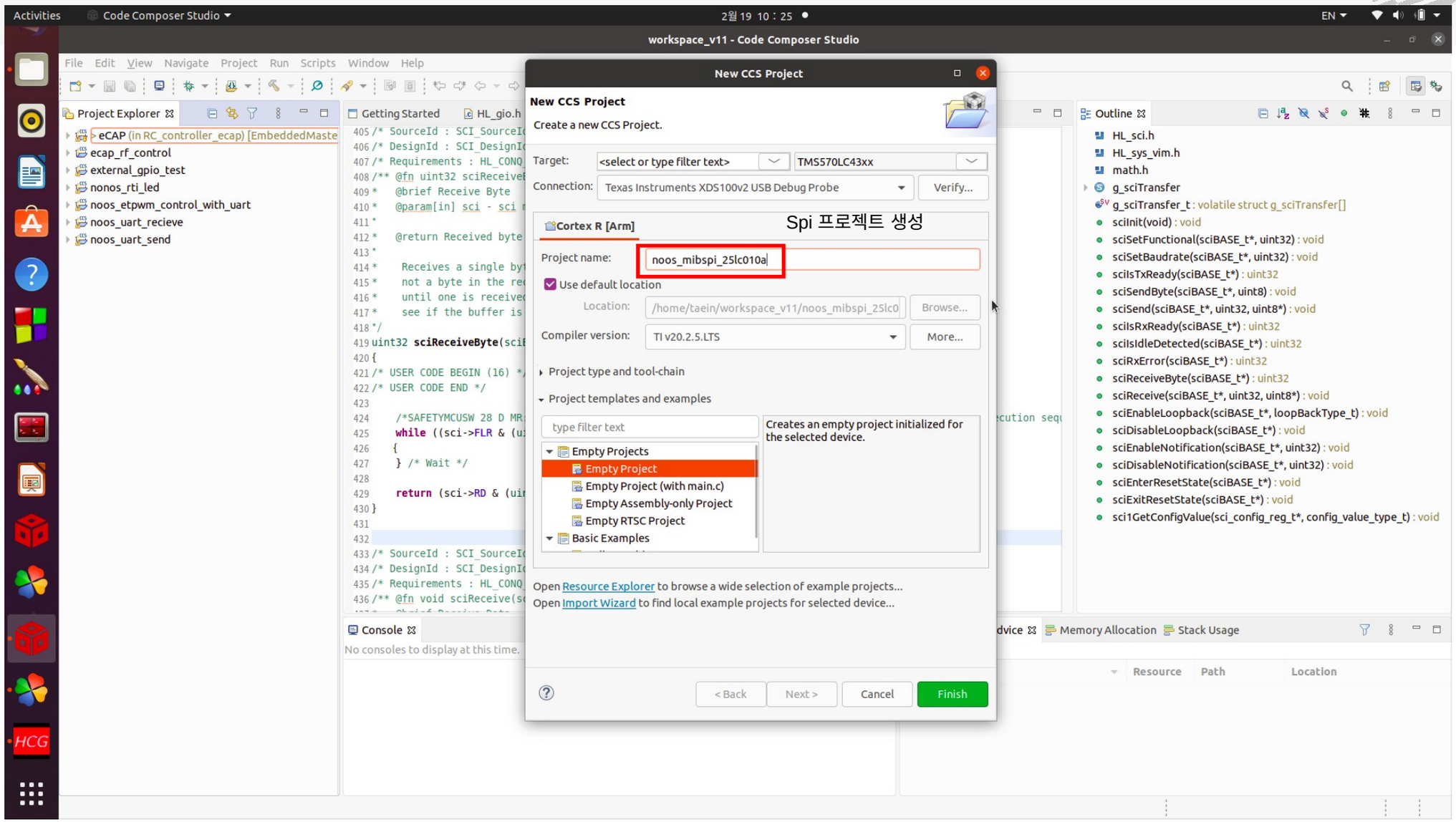
임베디드 마스터 Lv2 과정
[TMS 570_SPI(w/EEPROM]

제 1기

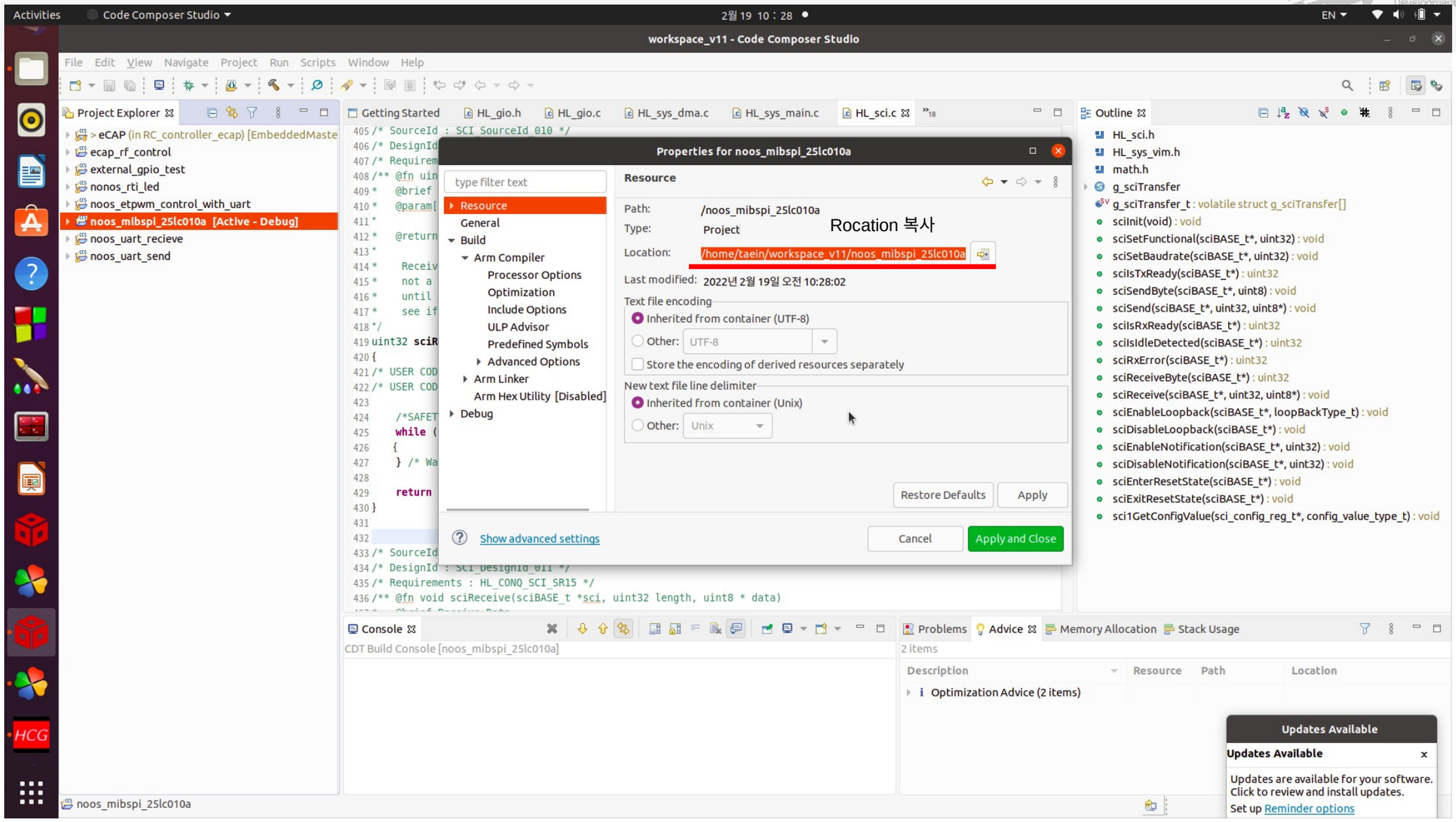
2022. 03. 18

박태인

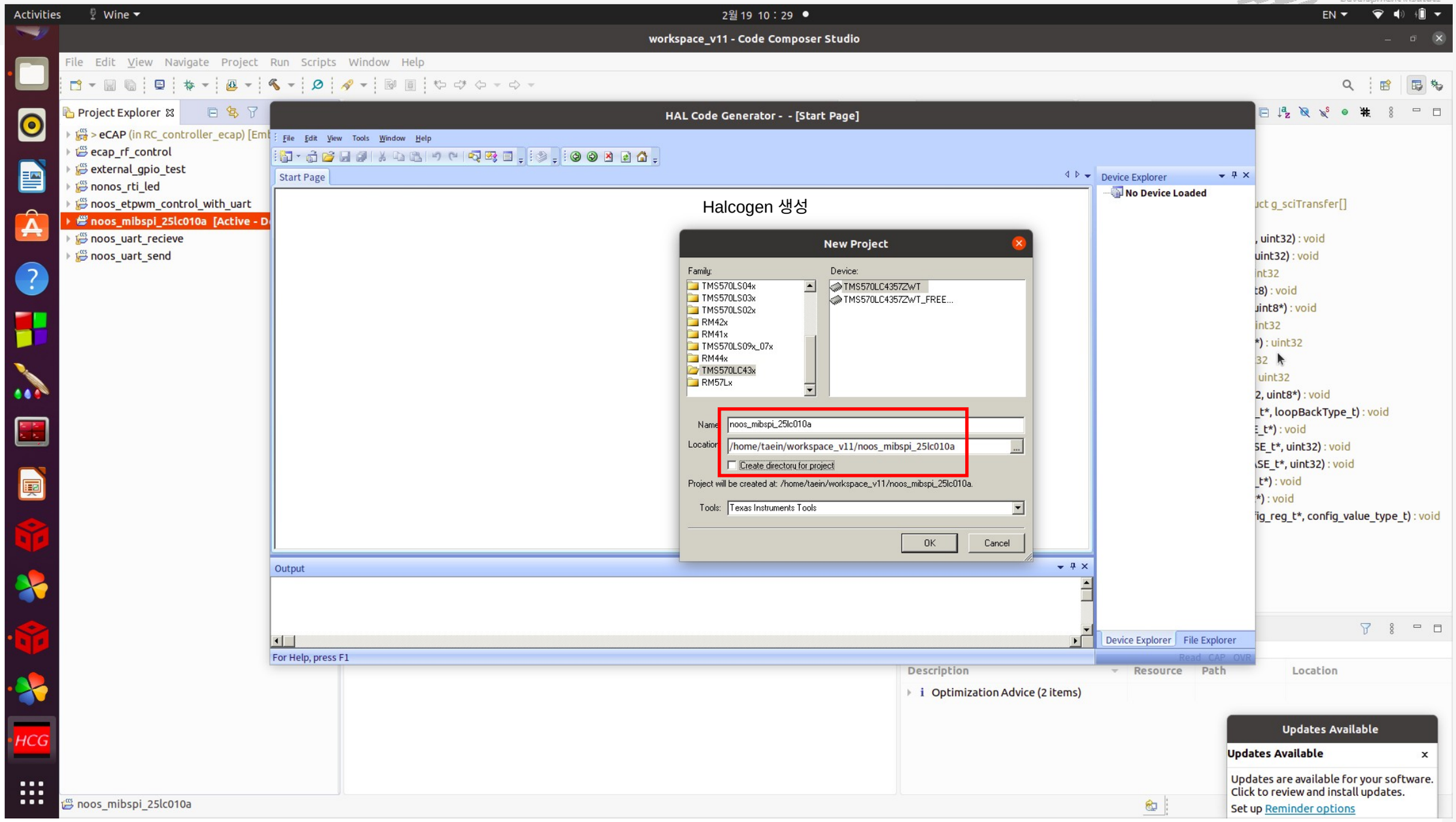
SPI(w/EEPROM)


Activities
Code Composer Studio
2월 19 10 : 25
EN
workspace_v11 - Code Composer Studio
File Edit View Navigate Project Run Scripts Window Help
Project Explorer
eCAP (in RC_controller_ecap) [EmbeddedMaste
ecap_rf_control
external_gpio_test
nonos_rti_led
noos_etpwm_control_with_uart
noos_uart_recieve
noos_uart_send
Getting Started
HL_gio.h
Outline
HL_sci.h
HL_sys_vim.h
math.h
g_sciTransfer
g_sciTransfer_t : volatile struct g_sciTransfer[]
sciInit(void) : void
sciSetFunctional(sciBASE_t*, uint32) : void
sciSetBaudrate(sciBASE_t*, uint32) : void
sciIsTxReady(sciBASE_t*) : uint32
sciSendByte(sciBASE_t*, uint8) : void
sciSend(sciBASE_t*, uint32, uint8*) : void
sciIsRxReady(sciBASE_t*) : uint32
sciIsIdleDetected(sciBASE_t*) : uint32
sciRxError(sciBASE_t*) : uint32
sciReceiveByte(sciBASE_t*) : uint32
sciReceive(sciBASE_t*, uint32, uint8*) : void
sciEnableLoopback(sciBASE_t*, loopBackType_t) : void
sciDisableLoopback(sciBASE_t*) : void
sciEnableNotification(sciBASE_t*, uint32) : void
sciDisableNotification(sciBASE_t*, uint32) : void
sciEnterResetState(sciBASE_t*) : void
sciExitResetState(sciBASE_t*) : void
sci1GetConfigValue(sci_config_reg_t*, config_value_type_t) : void
New CCS Project
New 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]
Spi 프로젝트 생성
Project name:
noos_mibspi_25lc010a
Use default location
Location:
/home/taein/workspace_v11/noos_mibspi_25lc0
Browse...
Compiler version:
TI v20.2.5.LTS
More...
Project type and tool-chain
Project templates and examples
type filter text
Empty Projects
Empty Project
Empty Project (with main.c)
Empty Assembly-only Project
Empty RTSC Project
Basic Examples
Creates an empty project initialized for the selected device.
Open Resource Explorer to browse a wide selection of example projects...
Open Import Wizard to find local example projects for selected device...
< Back
Next >
Cancel
Finish
Console
No consoles to display at this time.
Memory Allocation
Stack Usage
Resource
Path
Location

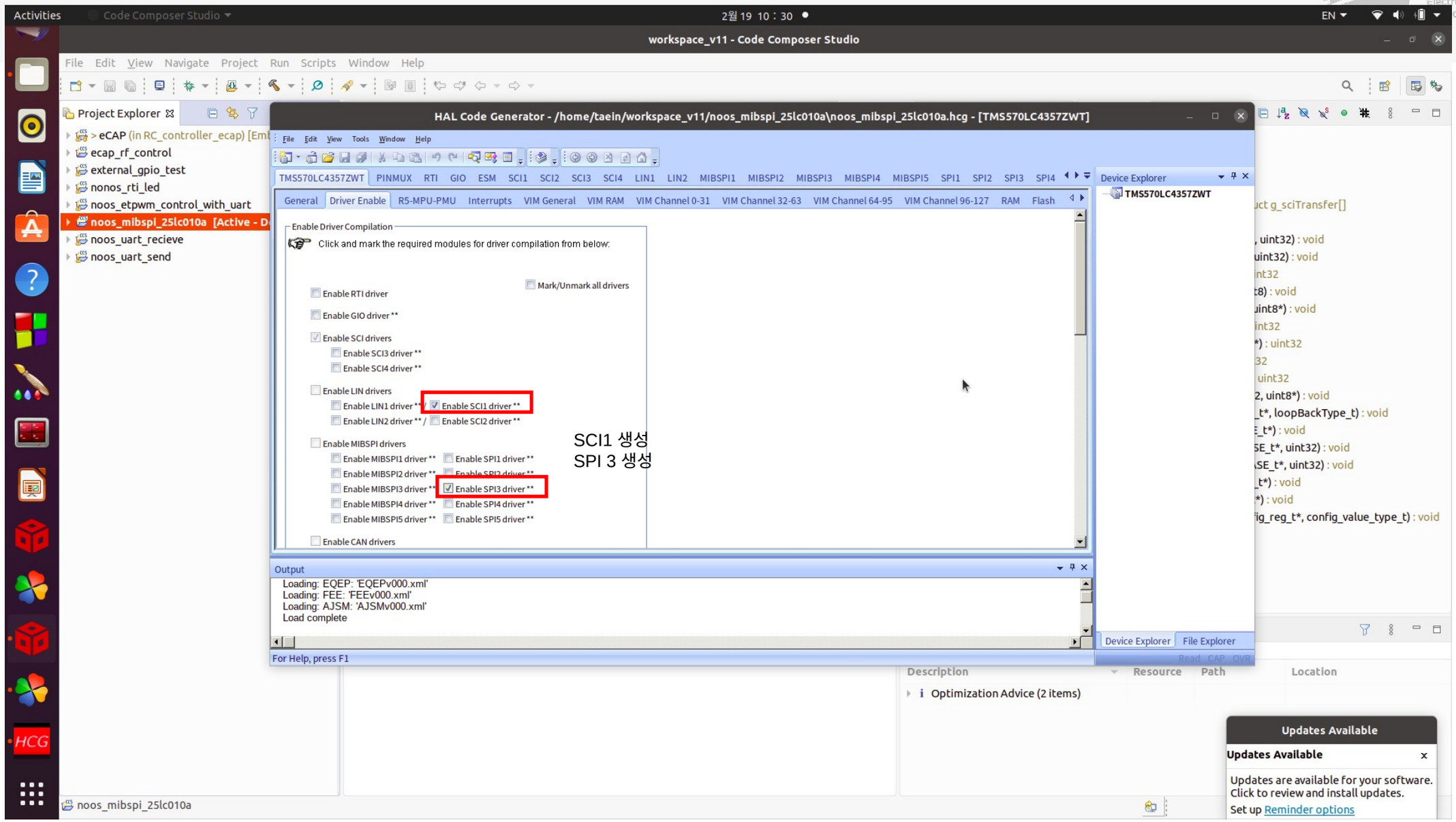
SPI(w/EEPROM)


workspace_v11 - Code Composer Studio
Properties for noos_mibspi_25lc010a
Resource
Path: /noos_mibspi_25lc010a
Type: Project
Location: /home/taein/workspace_v11/noos_mibspi_25lc010a
Rocation 복사
Last modified: 2022년 2월 19일 오전 10:28:02
Restore Defaults
Apply
Show advanced settings
Cancel
Apply and Close
Updates Available
Updates are available for your software.
Click to review and install updates.

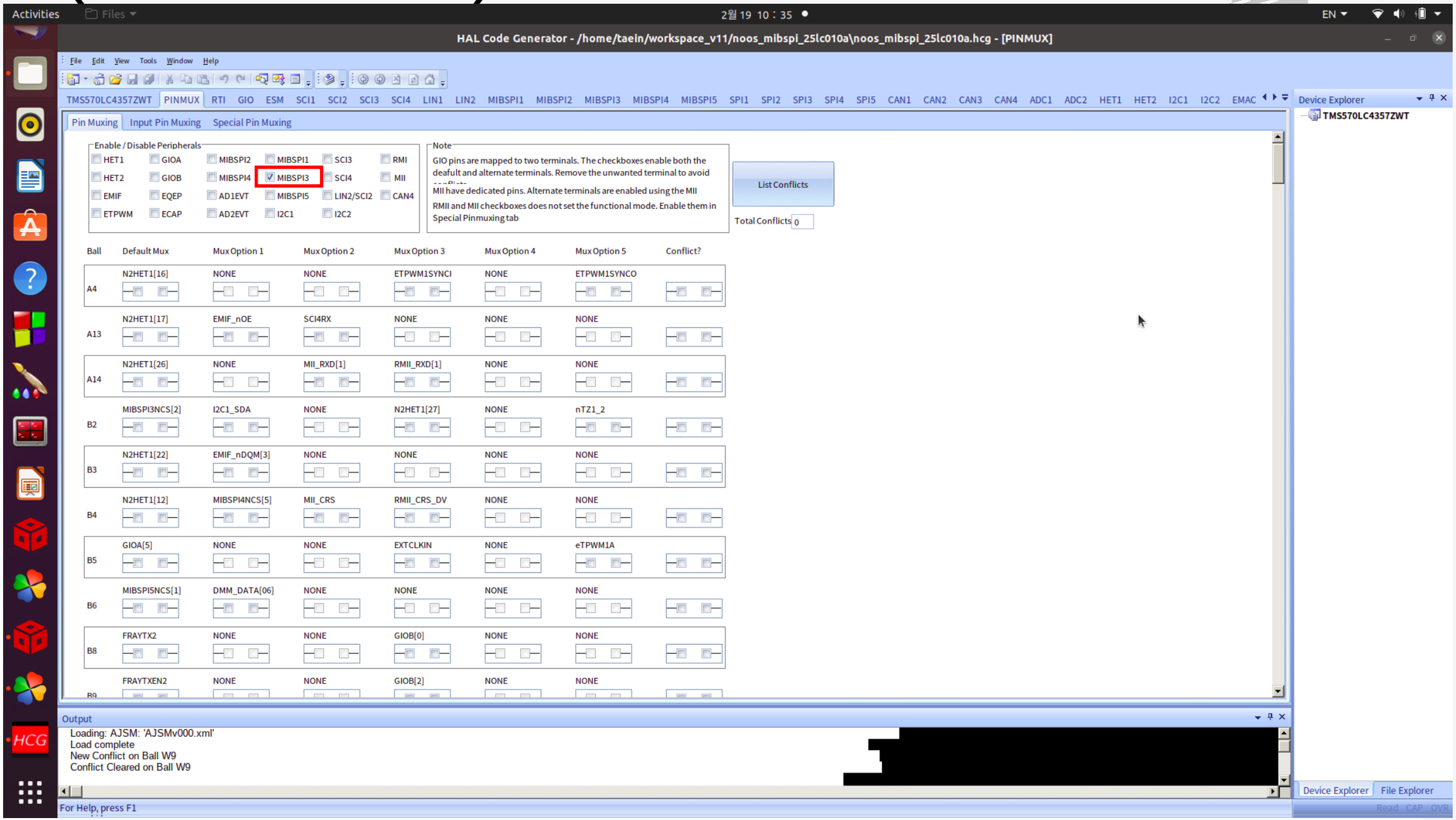
SPI(w/EEPROM)


Activities
Wine
2월 19 10 : 29
EN
workspace_v11 - Code Composer Studio
File Edit View Navigate Project Run Scripts Window Help
Project Explorer
> eCAP (in RC_controller_ecap) [Em
ecap_rf_control
external_gpio_test
nonos_rti_led
noos_etpwm_control_with_uart
noos_mibspi_25lc010a [Active - D
noos_uart_recieve
noos_uart_send
HAL Code Generator - - [Start Page]
File Edit View Tools Window Help
Start Page
Halcogen 생성
New Project
Family:
TMS570LS04x
TMS570LS03x
TMS570LS02x
RM42x
RM41x
TMS570LS09x_07x
RM44x
TMS570LC43x
RM57Lx
Device:
TMS570LC4357ZWT
TMS570LC4357ZWT_FREE...
Name: noos_mibspi_25lc010a
Location: /home/taein/workspace_v11/noos_mibspi_25lc010a
Create directory for project
Project will be created at: /home/taein/workspace_v11/noos_mibspi_25lc010a.
Tools: Texas Instruments Tools
OK
Cancel
Output
For Help, press F1
Device Explorer
No Device Loaded
Device Explorer
File Explorer
Description
Resource
Path
Location
Optimization Advice (2 items)
Updates Available
Updates Available
Updates are available for your software.
Click to review and install updates.
Set up Reminder options
noos_mibspi_25lc010a

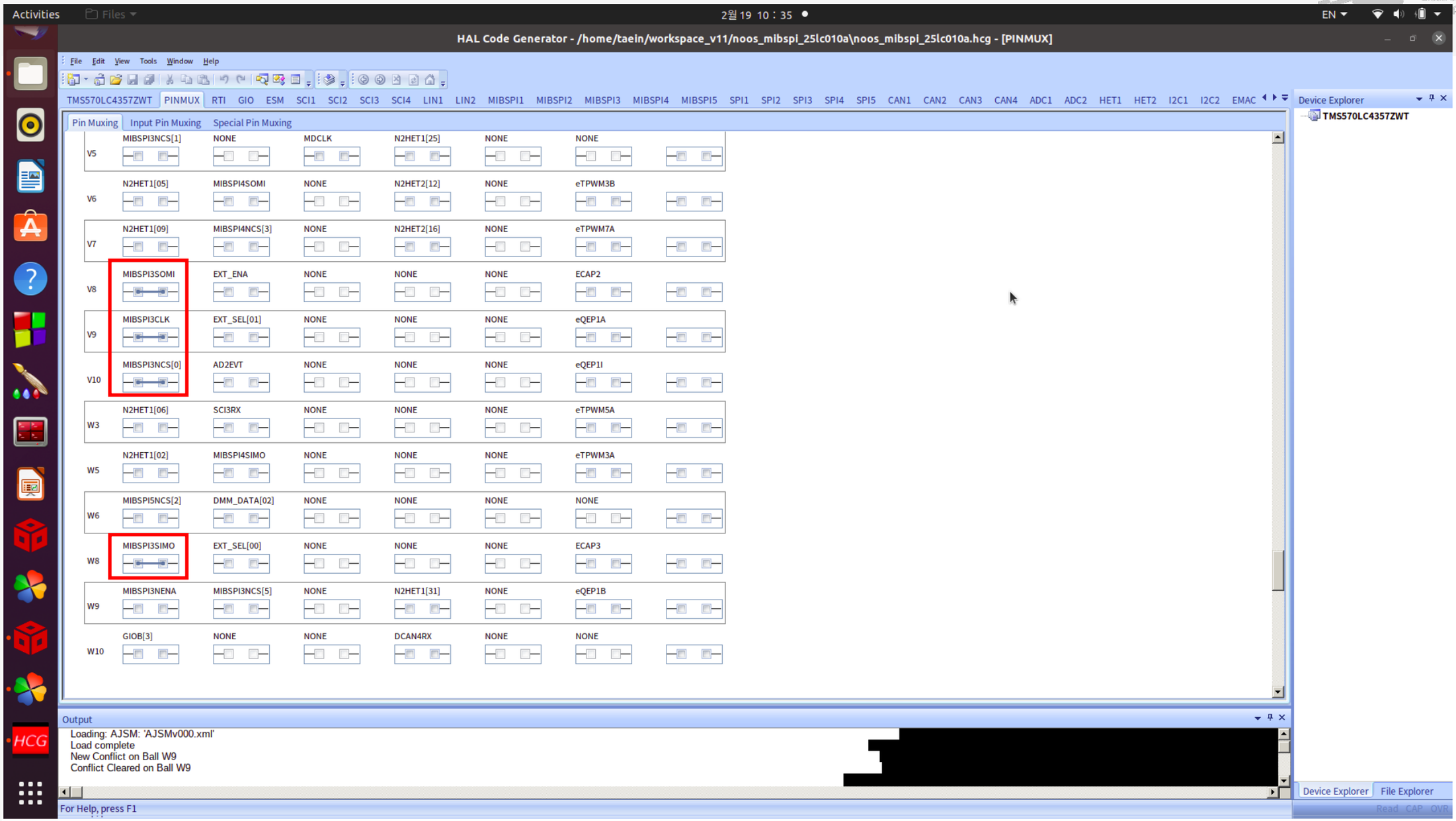
SPI(w/EEPROM)


Activities
Code Composer Studio
2월 19 10 : 30
EN
workspace_v11 - Code Composer Studio
File Edit View Navigate Project Run Scripts Window Help
Project Explorer
eCAP (in RC_controller_ecap) [Emb
ecap_rf_control
external_gpio_test
nonos_rti_led
noos_etpwm_control_with_uart
noos_mibspi_25lc010a [Active - D
noos_uart_recieve
noos_uart_send
HAL Code Generator - /home/taein/workspace_v11/noos_mibspi_25lc010a\noos_mibspi_25lc010a.hcg - [TMS570LC4357ZWT]
File Edit View Tools Window Help
TMS570LC4357ZWT PINMUX RTI GIO ESM SCI1 SCI2 SCI3 SCI4 LIN1 LIN2 MIBSPI1 MIBSPI2 MIBSPI3 MIBSPI4 MIBSPI5 SPI1 SPI2 SPI3 SPI4
General Driver Enable R5-MPU-PMU Interrupts VIM General VIM RAM VIM Channel 0-31 VIM Channel 32-63 VIM Channel 64-95 VIM Channel 96-127 RAM Flash
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 MIBSPI3 driver **
Enable SPI3 driver **
Enable MIBSPI4 driver **
Enable SPI4 driver **
Enable MIBSPI5 driver **
Enable SPI5 driver **
Enable CAN drivers
SCI1 생성
SPI 3 생성
Device Explorer
TMS570LC4357ZWT
Output
Loading: EQEP: 'EQEPv000.xml'
Loading: FEE: 'FEEv000.xml'
Loading: AJSM: 'AJSMv000.xml'
Load complete
For Help, press F1
Device Explorer File Explorer
Description Resource Path Location
Optimization Advice (2 items)
Updates Available
Updates Available
Updates are available for your software.
Click to review and install updates.
Set up Reminder options
noos_mibspi_25lc010a

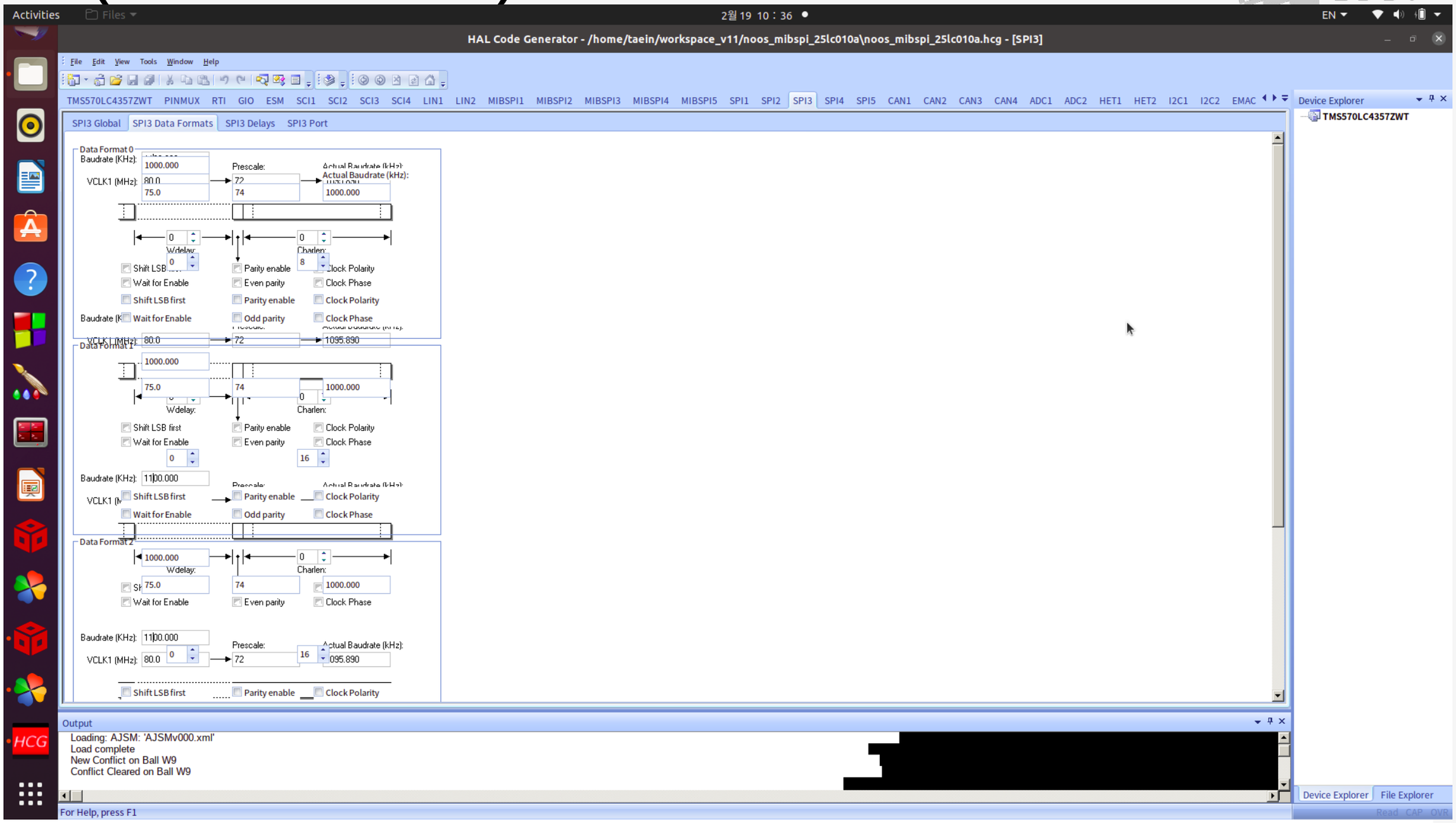
SPI(w/EEPROM)


Activities
Files
2월 19 10 : 35
EN
HAL Code Generator - /home/taein/workspace_v11/noos_mibspi_25lc010a\noos_mibspi_25lc010a.hcg - [PINMUX]
File Edit View Tools Window Help
TMS570LC4357ZWT PINMUX RTI GIO ESM SCI1 SCI2 SCI3 SCI4 LIN1 LIN2 MIBSPI1 MIBSPI2 MIBSPI3 MIBSPI4 MIBSPI5 SPI1 SPI2 SPI3 SPI4 SPI5 CAN1 CAN2 CAN3 CAN4 ADC1 ADC2 HET1 HET2 I2C1 I2C2 EMAC
Pin Muxing
Input Pin Muxing
Special Pin Muxing
Enable / Disable Peripherals
HET1 GIOA MIBSPI2 MIBSPI1 SCI3 RMI
HET2 GIOB MIBSPI4 MIBSPI3 SCI4 MII
EMIF EQEP AD1EVT MIBSPI5 LIN2/SCI2 CAN4
ETPWM ECAP AD2EVT I2C1 I2C2
Note
GIO pins are mapped to two terminals. The checkboxes enable both the deafult and alternate terminals. Remove the unwanted terminal to avoid
MII have dedicated pins. Alternate terminals are enabled using the MII
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
B8 FRAYTX2 NONE NONE GIOB[0] NONE NONE
B9 FRAYTXEN2 NONE NONE GIOB[2] NONE NONE
Device Explorer
TMS570LC4357ZWT
Output
Loading: AJSM: 'AJSMv000.xml'
Load complete
New Conflict on Ball W9
Conflict Cleared on Ball W9
Device Explorer
File Explorer
For Help, press F1
Read CAP OVR

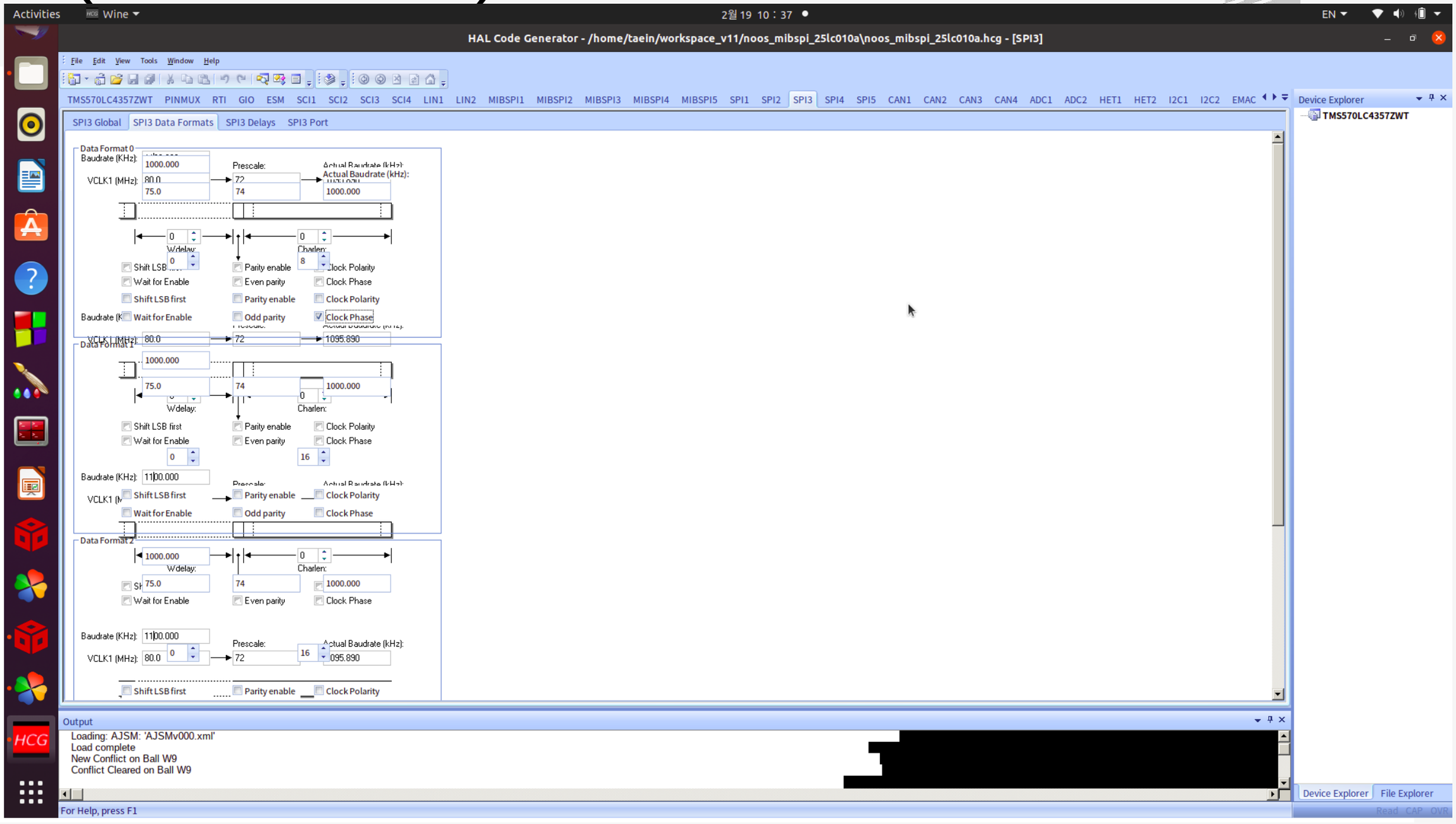
SPI(w/EEPROM)


Activities
Files
2월 19 10 : 35
EN
HAL Code Generator - /home/taein/workspace_v11/noos_mibspi_25lc010a\noos_mibspi_25lc010a.hcg - [PINMUX]
File Edit View Tools Window Help
TMS570LC4357ZWT PINMUX RTI GIO ESM SCI1 SCI2 SCI3 SCI4 LIN1 LIN2 MIBSPI1 MIBSPI2 MIBSPI3 MIBSPI4 MIBSPI5 SPI1 SPI2 SPI3 SPI4 SPI5 CAN1 CAN2 CAN3 CAN4 ADC1 ADC2 HET1 HET2 I2C1 I2C2 EMAC
Pin Muxing
Input Pin Muxing
Special Pin Muxing
Device Explorer
TMS570LC4357ZWT
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
W5 N2HET1[02] MIBSPI4SIMO NONE NONE NONE eTPWM3A
W6 MIBSPI5NCS[2] DMM_DATA[02] NONE NONE NONE NONE
W8 MIBSPI3SIMO EXT_SEL[00] NONE NONE NONE ECAP3
W9 MIBSPI3NENA MIBSPI3NCS[5] NONE N2HET1[31] NONE eQEP1B
W10 GIOB[3] NONE NONE DCAN4RX NONE NONE
Output
Loading: AJSM: 'AJSMv000.xml'
Load complete
New Conflict on Ball W9
Conflict Cleared on Ball W9
[redacted]
Device Explorer
File Explorer
For Help, press F1
Read CAP OVR

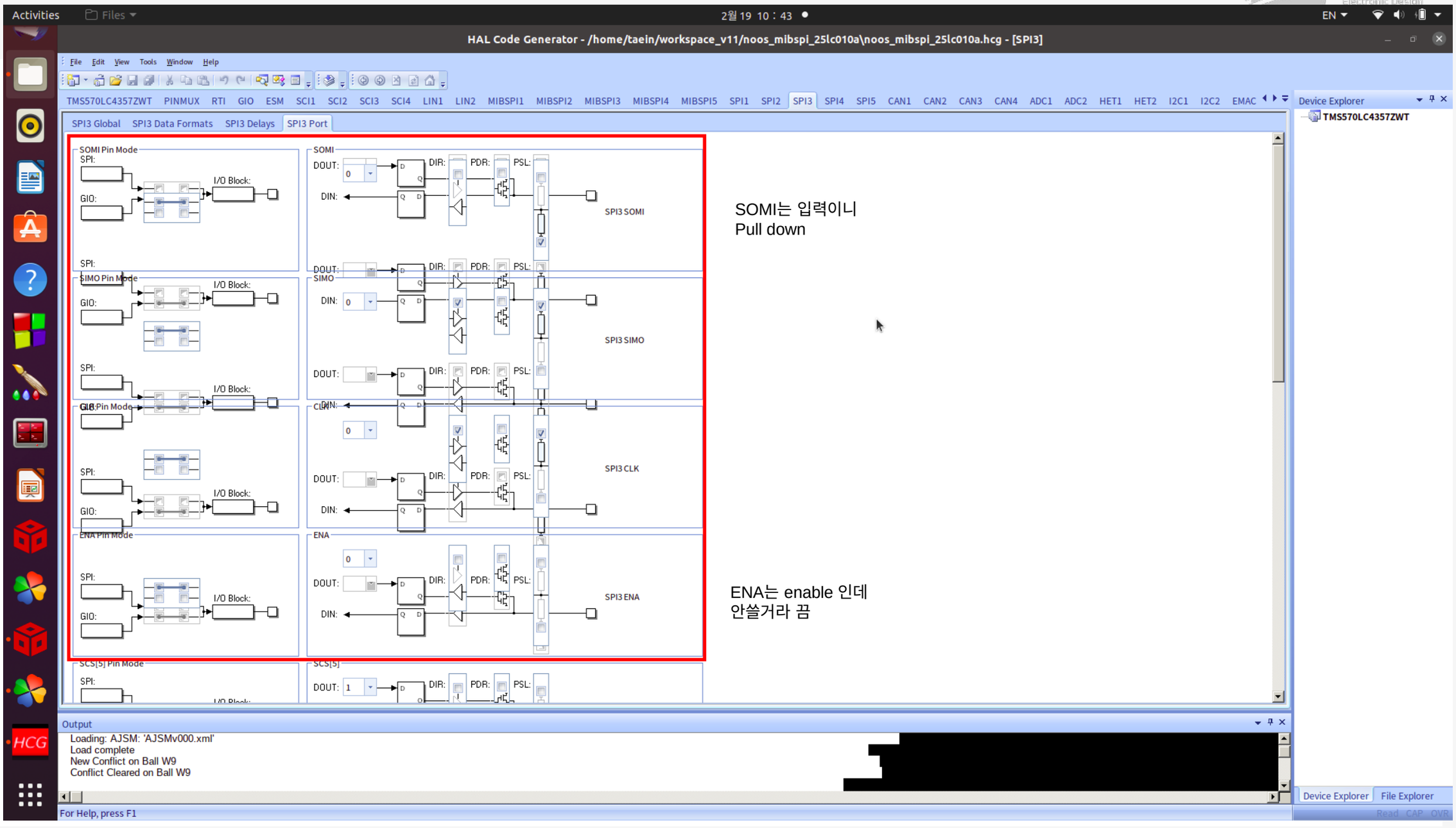
SPI(w/EEPROM)


Activities
Files
2월 19 10 : 36
EN
HAL Code Generator - /home/taein/workspace_v11/noos_mibspi_25lc010a\noos_mibspi_25lc010a.hcg - [SPI3]
File Edit View Tools Window Help
TMS570LC4357ZWT PINMUX RTI GIO ESM SCI1 SCI2 SCI3 SCI4 LIN1 LIN2 MIBSPI1 MIBSPI2 MIBSPI3 MIBSPI4 MIBSPI5 SPI1 SPI2 SPI3 SPI4 SPI5 CAN1 CAN2 CAN3 CAN4 ADC1 ADC2 HET1 HET2 I2C1 I2C2 EMAC
SPI3 Global
SPI3 Data Formats
SPI3 Delays
SPI3 Port
Data Format 0
Baudrate (KHz): 1000.000
VCLK1 (MHz): 80.0
75.0
Prescale:
72
74
Actual Baudrate (kHz):
1000.000
Wdelay:
Charlen:
Shift LSB first
Wait for Enable
Parity enable
Even parity
Odd parity
Clock Polarity
Clock Phase
Data Format 1
Baudrate (KHz): 1100.000
VCLK1 (MHz): 80.0
72
1095.890
Data Format 2
Device Explorer
TMS570LC4357ZWT
Output
Loading: AJSM: 'AJSMv000.xml'
Load complete
New Conflict on Ball W9
Conflict Cleared on Ball W9
Device Explorer
File Explorer
For Help, press F1

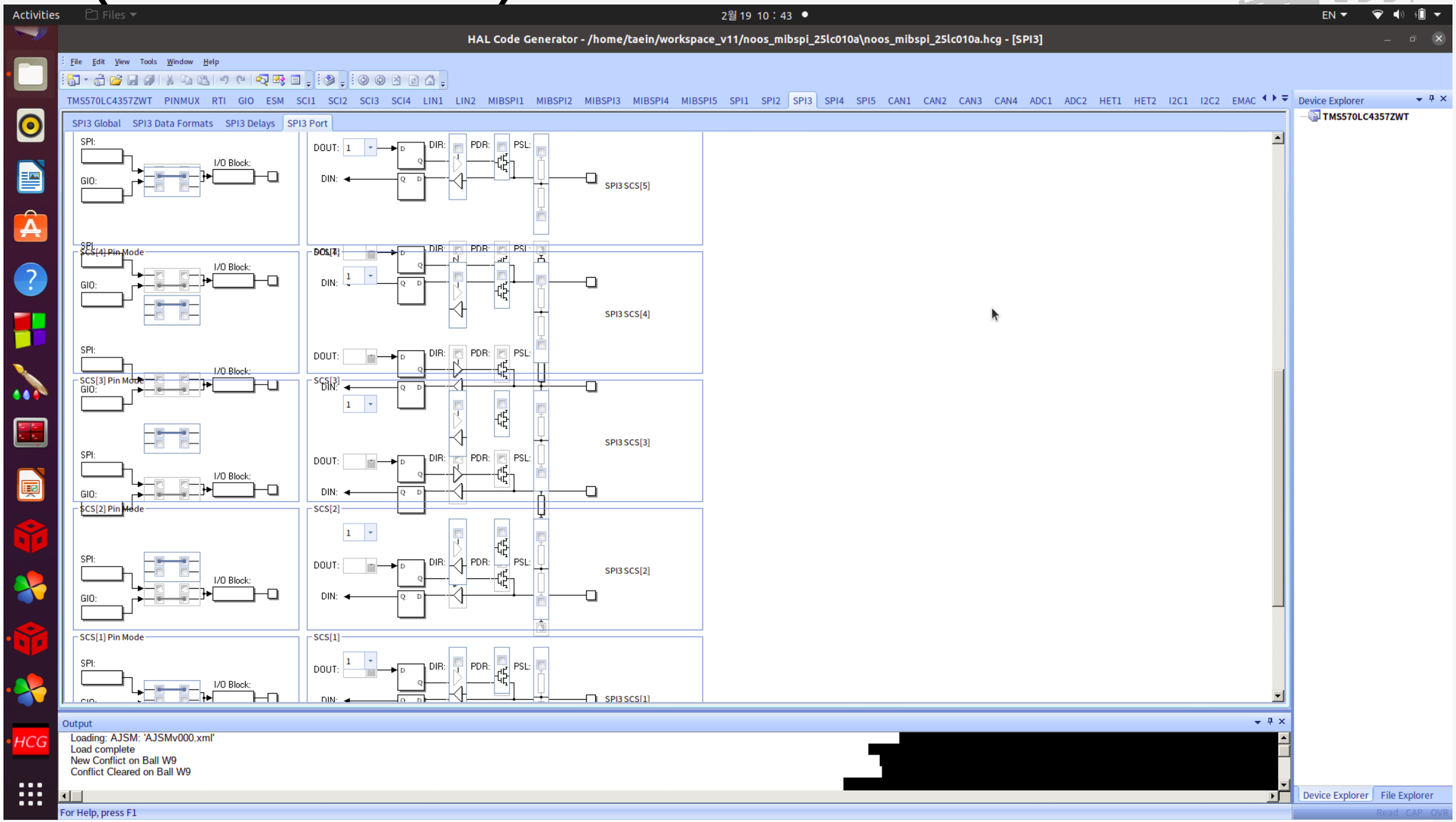
SPI(w/EEPROM)


Activities
Wine
2월 19 10 : 37
EN
HAL Code Generator - /home/taein/workspace_v11/noos_mibspi_25lc010a\noos_mibspi_25lc010a.hcg - [SPI3]
File Edit View Tools Window Help
TMS570LC4357ZWT PINMUX RTI GIO ESM SCI1 SCI2 SCI3 SCI4 LIN1 LIN2 MIBSPI1 MIBSPI2 MIBSPI3 MIBSPI4 MIBSPI5 SPI1 SPI2 SPI3 SPI4 SPI5 CAN1 CAN2 CAN3 CAN4 ADC1 ADC2 HET1 HET2 I2C1 I2C2 EMAC
SPI3 Global
SPI3 Data Formats
SPI3 Delays
SPI3 Port
Data Format 0
Baudrate (KHz): 1000.000
VCLK1 (MHz): 80.0
75.0
Prescale:
72
74
Actual Baudrate (kHz):
1000.000
Wdelay:
Charlen:
Shift LSB first
Wait for Enable
Parity enable
Even parity
Odd parity
Clock Polarity
Clock Phase
Data Format 1
1095.890
Data Format 2
Device Explorer
TMS570LC4357ZWT
Output
Loading: AJSM: 'AJSMv000.xml'
Load complete
New Conflict on Ball W9
Conflict Cleared on Ball W9
Device Explorer
File Explorer
For Help, press F1

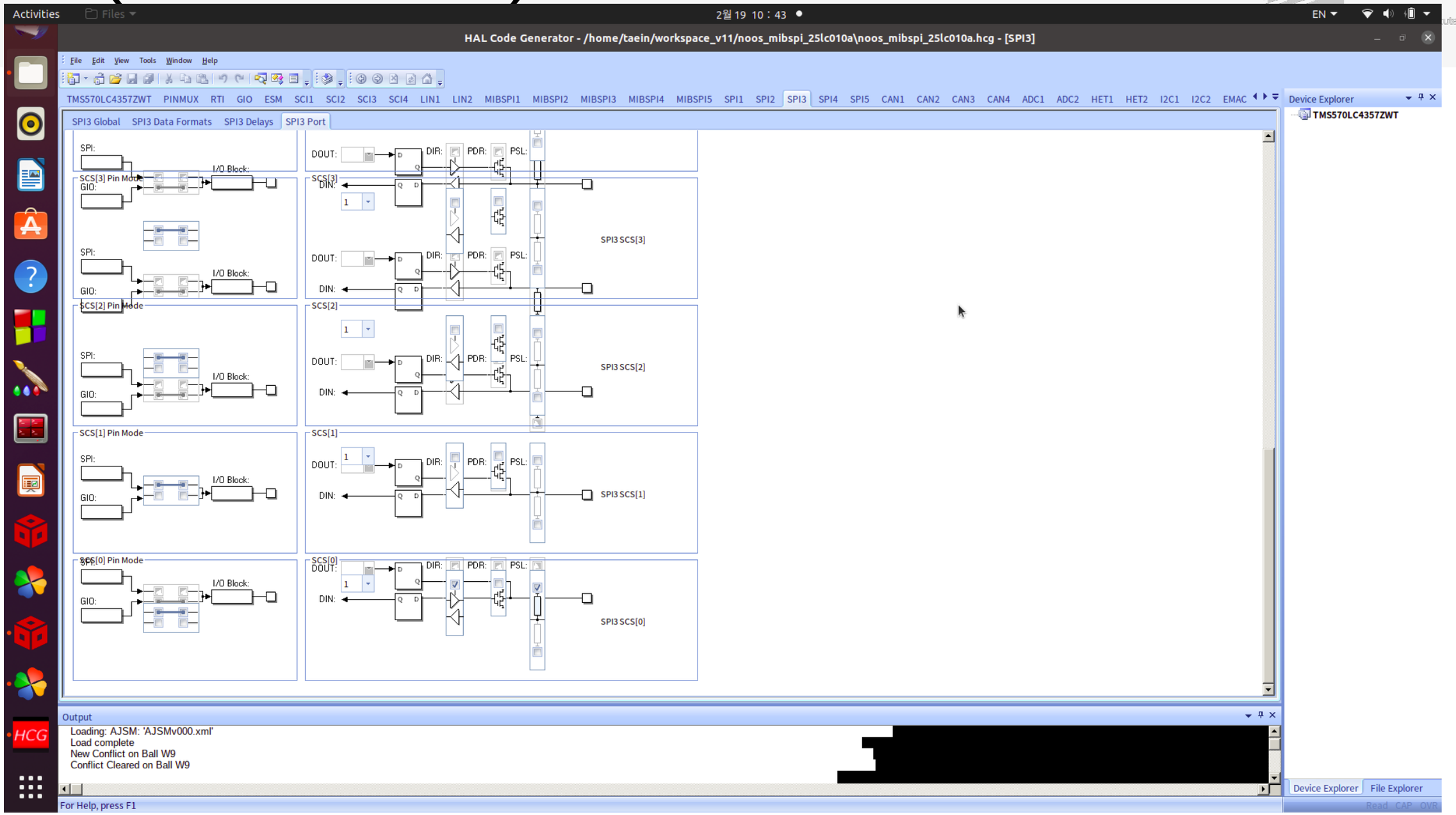
SPI(w/EEPROM)


Activities
Files
2월 19 10 : 43
EN
HAL Code Generator - /home/taein/workspace_v11/noos_mibspi_25lc010a\noos_mibspi_25lc010a.hcg - [SPI3]
File Edit View Tools Window Help
TMS570LC4357ZWT PINMUX RTI GIO ESM SCI1 SCI2 SCI3 SCI4 LIN1 LIN2 MIBSPI1 MIBSPI2 MIBSPI3 MIBSPI4 MIBSPI5 SPI1 SPI2 SPI3 SPI4 SPI5 CAN1 CAN2 CAN3 CAN4 ADC1 ADC2 HET1 HET2 I2C1 I2C2 EMAC
SPI3 Global SPI3 Data Formats SPI3 Delays SPI3 Port
SOMI Pin Mode
SPI:
GIO:
I/O Block:
SOMI
DOUT:
DIN:
DIR:
PDR:
PSL:
SPI3 SOMI
SIMO Pin Mode
SIMO
SPI3 SIMO
CLK Pin Mode
CLK
SPI3 CLK
ENA Pin Mode
ENA
SPI3 ENA
SCS[5] Pin Mode
SCS[5]
Device Explorer
TMS570LC4357ZWT
SOMI는 입력이니
Pull down
ENA는 enable 인데
안쓸거라 끔
Output
Loading: AJSM: 'AJSMv000.xml'
Load complete
New Conflict on Ball W9
Conflict Cleared on Ball W9
Device Explorer
File Explorer
For Help, press F1

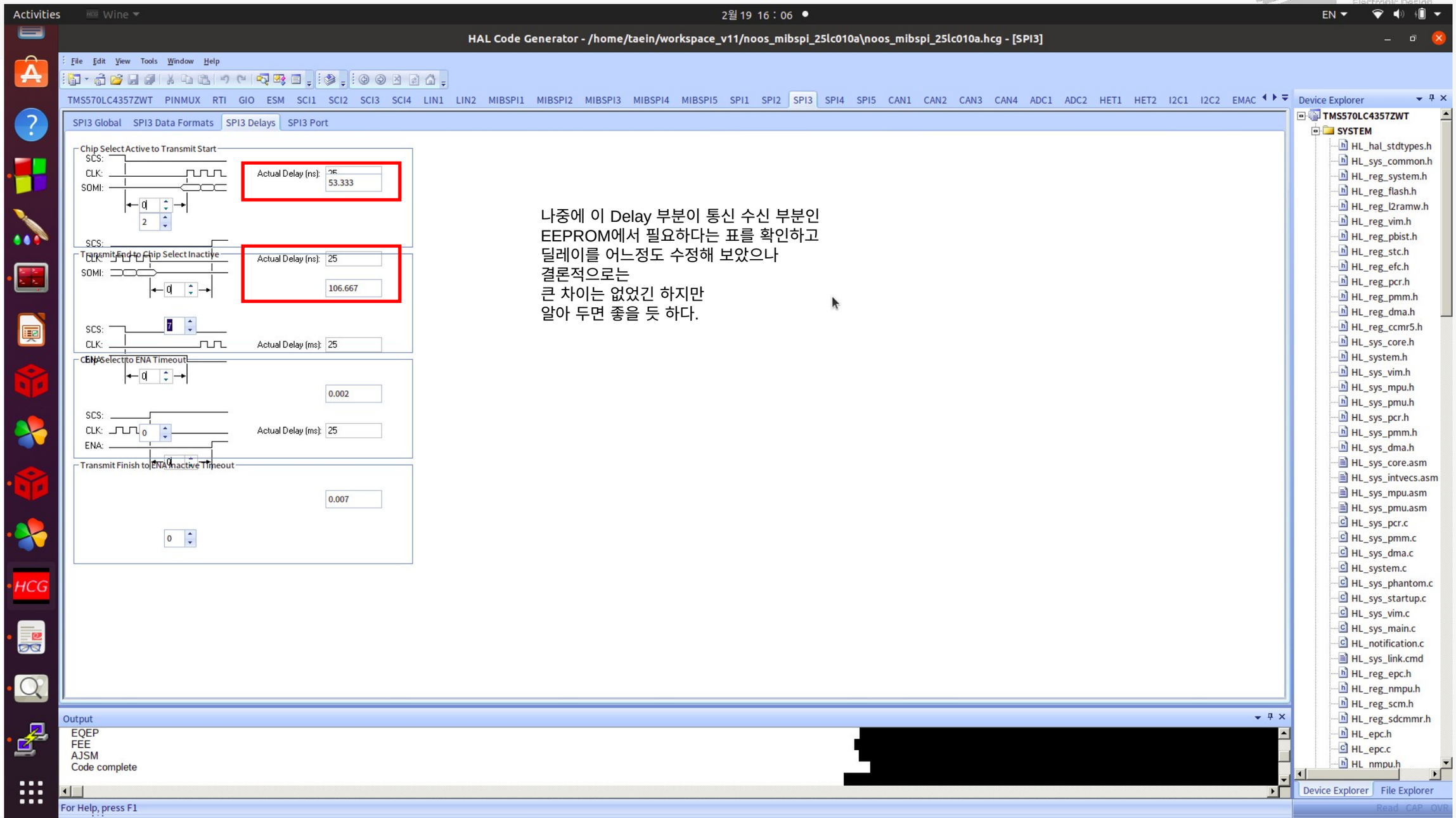
SPI(w/EEPROM)


Activities
Files
2월 19 10 : 43
EN
HAL Code Generator - /home/taein/workspace_v11/noos_mibspi_25lc010a\noos_mibspi_25lc010a.hcg - [SPI3]
File Edit View Tools Window Help
TMS570LC4357ZWT PINMUX RTI GIO ESM SCI1 SCI2 SCI3 SCI4 LIN1 LIN2 MIBSPI1 MIBSPI2 MIBSPI3 MIBSPI4 MIBSPI5 SPI1 SPI2 SPI3 SPI4 SPI5 CAN1 CAN2 CAN3 CAN4 ADC1 ADC2 HET1 HET2 I2C1 I2C2 EMAC
SPI3 Global SPI3 Data Formats SPI3 Delays SPI3 Port
SPI:
GIO:
I/O Block:
DOUT:
DIN:
DIR:
PDR:
PSL:
SPI3 SCS[5]
SCS[4] Pin Mode
SPI3 SCS[4]
SCS[3] Pin Mode
SPI3 SCS[3]
SCS[2] Pin Mode
SPI3 SCS[2]
SCS[1] Pin Mode
SPI3 SCS[1]
Device Explorer
TMS570LC4357ZWT
Output
Loading: AJSM: 'AJSMv000.xml'
Load complete
New Conflict on Ball W9
Conflict Cleared on Ball W9
Device Explorer
File Explorer
For Help, press F1

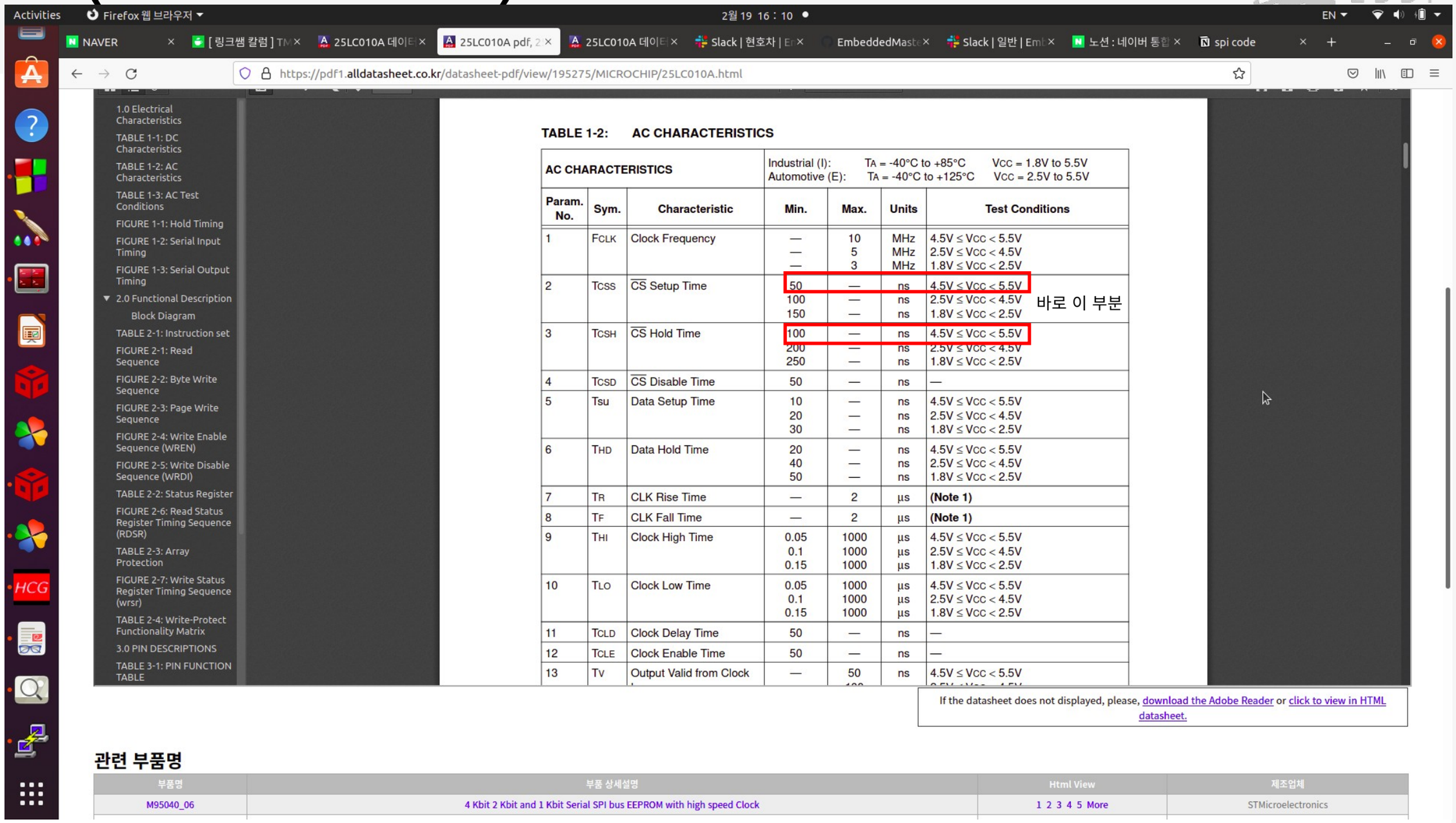
SPI(w/EEPROM)


Activities
Files
2월 19 10 : 43
EN
HAL Code Generator - /home/taein/workspace_v11/noos_mibspi_25lc010a\noos_mibspi_25lc010a.hcg - [SPI3]
File Edit View Tools Window Help
TMS570LC4357ZWT PINMUX RTI GIO ESM SCI1 SCI2 SCI3 SCI4 LIN1 LIN2 MIBSPI1 MIBSPI2 MIBSPI3 MIBSPI4 MIBSPI5 SPI1 SPI2 SPI3 SPI4 SPI5 CAN1 CAN2 CAN3 CAN4 ADC1 ADC2 HET1 HET2 I2C1 I2C2 EMAC
SPI3 Global SPI3 Data Formats SPI3 Delays SPI3 Port
SPI:
I/O Block:
GIO:
SCS[3] Pin Mode
SCS[2] Pin Mode
SCS[1] Pin Mode
SCS[0] Pin Mode
DOUT:
DIN:
DIR:
PDR:
PSL:
SCS[3]
SCS[2]
SCS[1]
SCS[0]
SPI3 SCS[3]
SPI3 SCS[2]
SPI3 SCS[1]
SPI3 SCS[0]
Device Explorer
TMS570LC4357ZWT
Output
Loading: AJSM: 'AJSMv000.xml'
Load complete
New Conflict on Ball W9
Conflict Cleared on Ball W9
Device Explorer
File Explorer
For Help, press F1

SPI(w/EEPROM)


HAL Code Generator - /home/taein/workspace_v11/noos_mibspi_25lc010a\noos_mibspi_25lc010a.hcg - [SPI3]
SPI3 Global
SPI3 Data Formats
SPI3 Delays
SPI3 Port
Chip Select Active to Transmit Start
Actual Delay (ns): 53.333
Transmit End to Chip Select Inactive
Actual Delay (ns): 25
106.667
Actual Delay (ns): 25
Actual Delay (ns): 25
0.002
Transmit Finish to ENA Inactive Timeout
0.007
나중에 이 Delay 부분이 통신 수신 부분인
EEPROM에서 필요하다는 표를 확인하고
딜레이를 어느정도 수정해 보았으나
결론적으로는
큰 차이는 없었긴 하지만
알아 두면 좋을 듯 하다.
Output
EQEP
FEE
AJSM
Code complete
Device Explorer
TMS570LC4357ZWT
SYSTEM

SPI(w/EEPROM)



Activities Firefox 웹 브라우저 2월 19 16 : 10 EN

NAVER | [링크샘 칼럼] TM | 25LC010A 데이터 | 25LC010A pdf, 2 | 25LC010A 데이터 | Slack | 현호차 | Em | EmbeddedMaste | Slack | 일반 | Emb | 노션 : 네이버 통합 | spi code

https://pdf1.alldatasheet.co.kr/datasheet-pdf/view/195275/MICROCHIP/25LC010A.html

1.0 Electrical Characteristics
TABLE 1-1: DC Characteristics
TABLE 1-2: AC Characteristics
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TABLE 1-2: AC CHARACTERISTICS

AC CHARACTERISTICS			Industrial (I): TA = -40°C to +85°C VCC = 1.8V to 5.5V Automotive (E): TA = -40°C to +125°C VCC = 2.5V to 5.5V			
Param. No.	Sym.	Characteristic	Min.	Max.	Units	Test Conditions
1	FCLK	Clock Frequency	— — —	10 5 3	MHz MHz MHz	4.5V ≤ VCC < 5.5V 2.5V ≤ VCC < 4.5V 1.8V ≤ VCC < 2.5V
2	TCSS	$\overline{CS}$ Setup Time	50 100 150	— — —	ns ns ns	4.5V ≤ VCC < 5.5V 2.5V ≤ VCC < 4.5V 1.8V ≤ VCC < 2.5V
3	TCSH	$\overline{CS}$ Hold Time	100 200 250	— — —	ns ns ns	4.5V ≤ VCC < 5.5V 2.5V ≤ VCC < 4.5V 1.8V ≤ VCC < 2.5V
4	TCSD	$\overline{CS}$ Disable Time	50	—	ns	—
5	Tsu	Data Setup Time	10 20 30	— — —	ns ns ns	4.5V ≤ VCC < 5.5V 2.5V ≤ VCC < 4.5V 1.8V ≤ VCC < 2.5V
6	THD	Data Hold Time	20 40 50	— — —	ns ns ns	4.5V ≤ VCC < 5.5V 2.5V ≤ VCC < 4.5V 1.8V ≤ VCC < 2.5V
7	TR	CLK Rise Time	—	2	µs	**(Note 1)**
8	TF	CLK Fall Time	—	2	µs	**(Note 1)**
9	THI	Clock High Time	0.05 0.1 0.15	1000 1000 1000	µs µs µs	4.5V ≤ VCC < 5.5V 2.5V ≤ VCC < 4.5V 1.8V ≤ VCC < 2.5V
10	TLO	Clock Low Time	0.05 0.1 0.15	1000 1000 1000	µs µs µs	4.5V ≤ VCC < 5.5V 2.5V ≤ VCC < 4.5V 1.8V ≤ VCC < 2.5V
11	TCLD	Clock Delay Time	50	—	ns	—
12	TCLE	Clock Enable Time	50	—	ns	—
13	TV	Output Valid from Clock	—	50	ns	4.5V ≤ VCC < 5.5V

바로 이 부분

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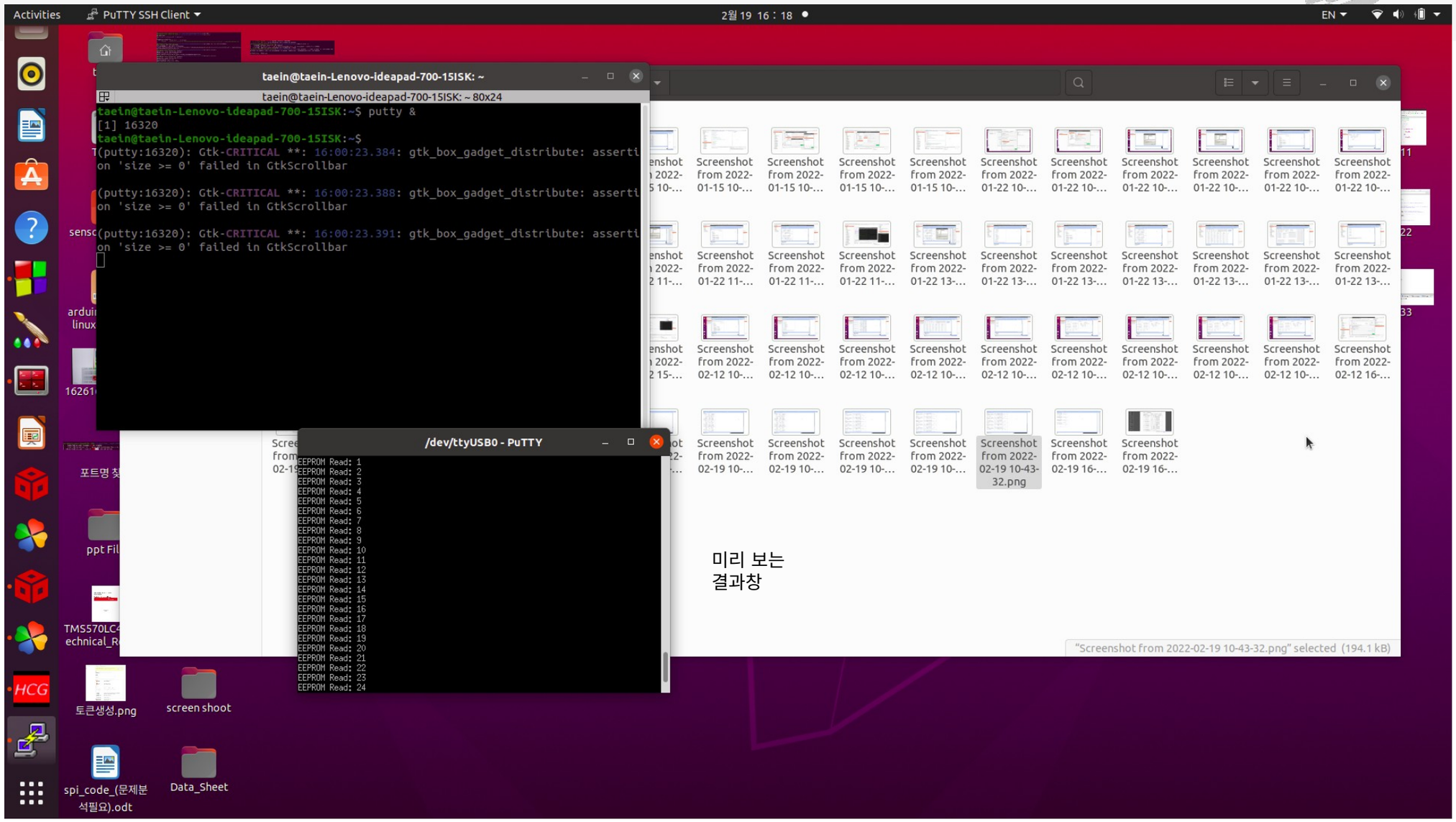
관련 부품명

부품명	부품 상세설명	Html View	제조업체
M95040_06	4 Kbit 2 Kbit and 1 Kbit Serial SPI bus EEPROM with high speed Clock	1 2 3 4 5 More	STMicroelectronics

SPI(w/EEPROM)



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