

# S5D9 SPI Bus Example (SCI\_SPI Framework Version)

By

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E2 Studio 5.4.0.023

SSP 1.3.0

ThreadX ROTC

# s5d9\_lab\_spi (PMOD)

1. Use PMOD J5
2. SSP 1.3.0
3. E2 studio Version: 5.4.0.023

## Project Summary

Board: S5D9\_IOT\_ENABLER  
Device: R7FS5D97E2A01CLK  
Toolchain: GCC ARM Embedded  
Toolchain Version: 4.9.3.20150529  
SSP Version: 1.3.0

Selected software components:

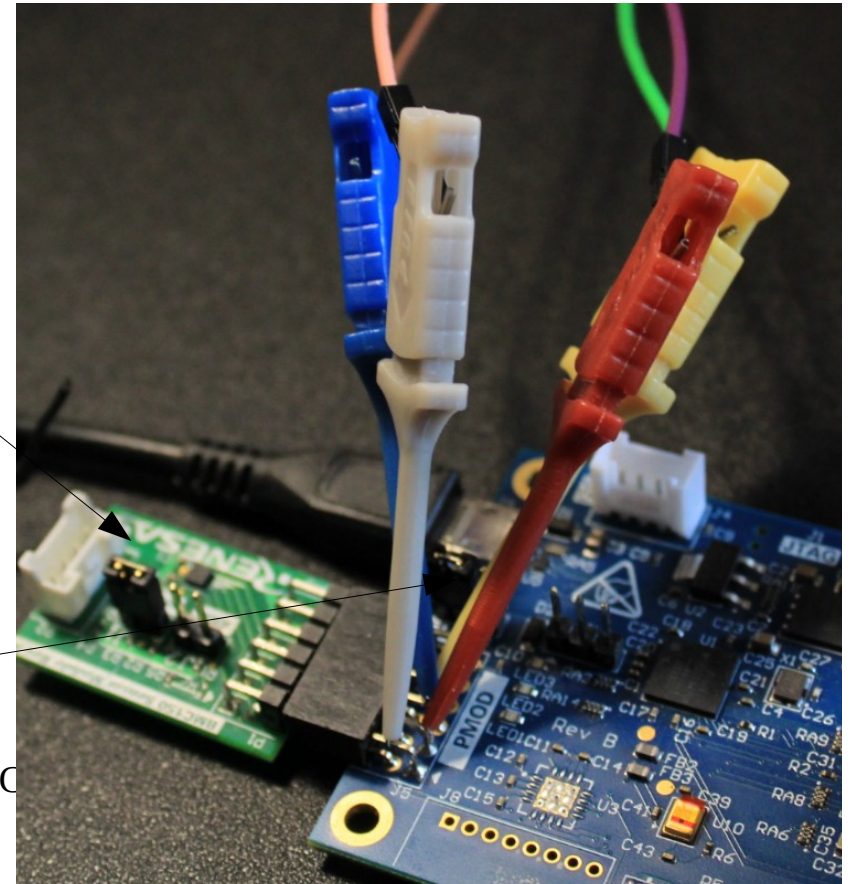


Jumper close for SPI Mode

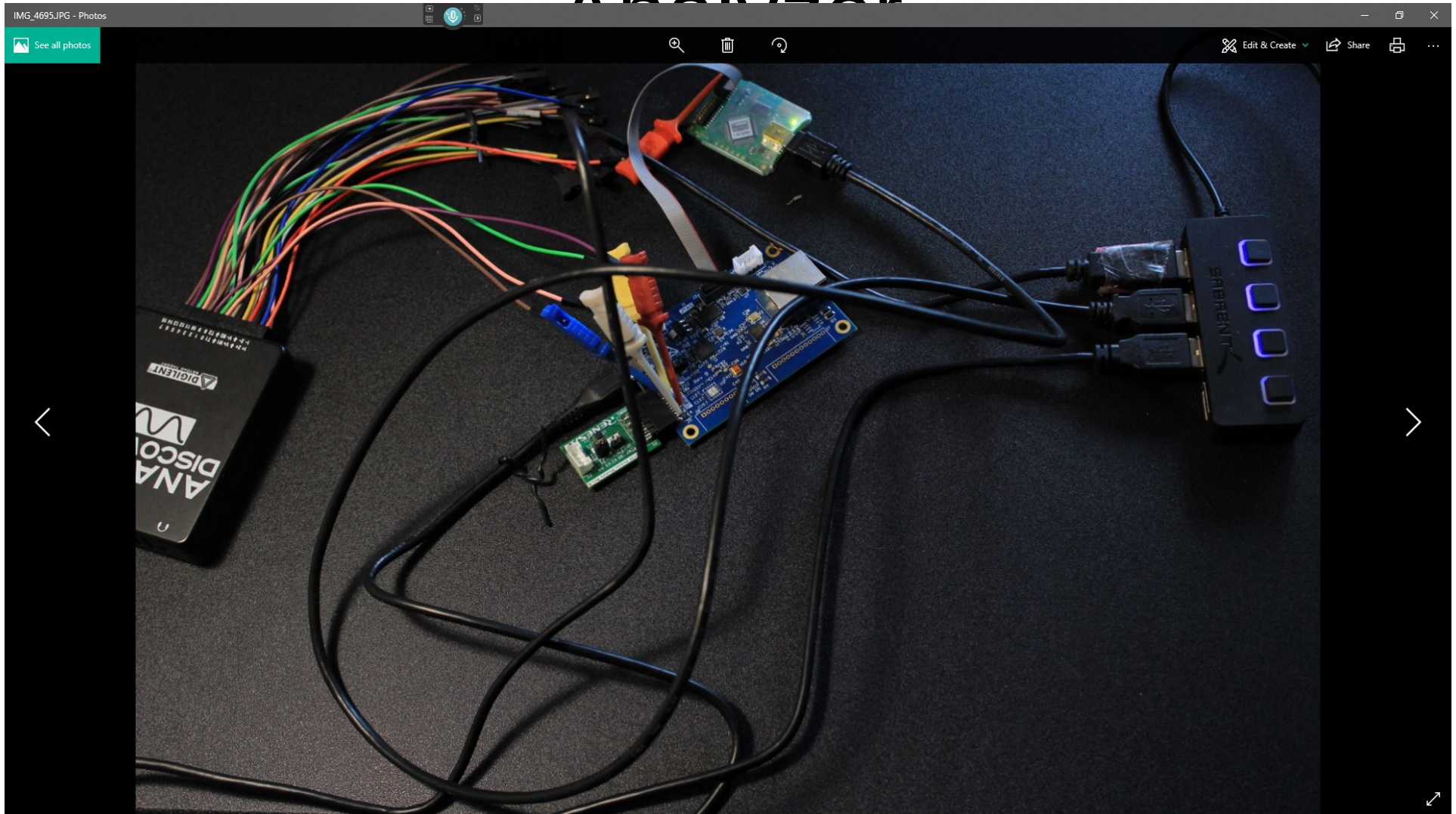
D0 P1 CSB  
D2 P2 MOSI  
D3 P3 MISO  
D1 P4 CK  
P5 GND  
P6 VCC = 3.3V (due to JMP)

SPI Example by Michael C

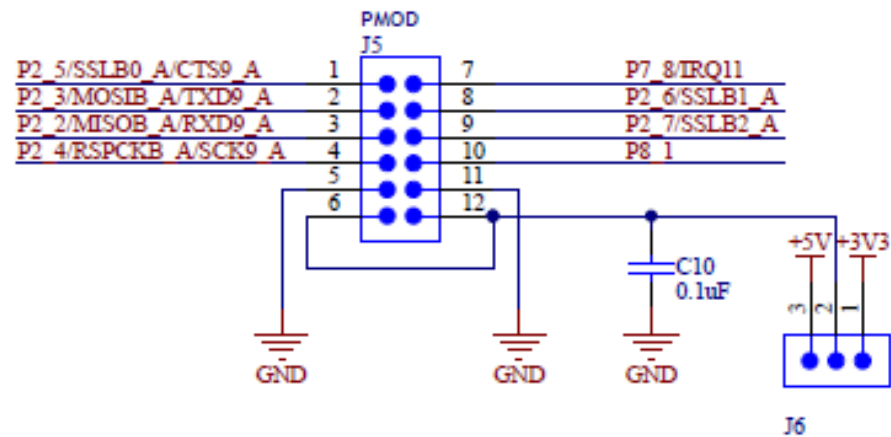
Px = PMOD pin, Dx = Scope pin



# The Hardware Setup with The Logic Analyzer



# PMOD Schematic





# Disable SPI1

The screenshot displays the Synergy Configuration IDE interface for a project named "SSD9\_ex8\_sci\_spi\_sftx\_c0p2". The main window is titled "Pins" and shows the configuration for the SPI1 module. The "Pin Selection" pane on the left lists various peripherals, with "SPI1" selected under the "Connectivity:SPI" category. The "Pin Configuration" pane on the right shows the module name as "SPI1" and the usage as "For SPI, same Pin Group recommended". The "Pin Group Selection" is set to "\_A only" and the "Operation Mode" is set to "Disabled". The "Input/Output" section shows the MISO, MOSI, RSPCK, SSL0, SSL1, SSL2, and SSL3 pins, all of which are currently set to "None".

The "Project Explorer" on the left shows the project structure, including the "configuration.xml" file and the "SSD9-ex8-spi-sftx-c0p2" project. The "Properties" pane at the bottom left indicates that "Properties are not available." The "Console" pane at the bottom right shows the GDB server output, which includes the following text:

```
<terminated> SSD9_ex7_rspi_sftx_c0p2 Debug [Renesas GDB Hardware Debugging] GDB server
Target connection status - OK
Starting download
Option Function Select, writing to address 0x00000400 with data ffffffff
SECMFUXxx, writing to address 0x00000408 with data ffffffff
Finished download
Hardware breakpoint set at address 0x45fe
Hardware breakpoint set at address 0x45fe
Hardware breakpoint set at address 0x45fe
Starting download
Option Function Select, writing to address 0x00000400 with data ffffffff
SECMFUXxx, writing to address 0x00000408 with data ffffffff
Finished download
Hardware breakpoint set at address 0x45fe
Hardware breakpoint set at address 0x45fe
Hardware breakpoint set at address 0x45fe
Disconnected from the Target Debugger.
```



# Enable SCI9

Synergy Configuration - S5D9\_ex8\_sci\_sftx\_c0p2/configuration.xml - e2 studio

File Edit Navigate Search Project Renesas Views Run Window Help

Project Explorer

- amsRenesasSensorBoard
- blinky
- blinky\_RTIC
- S5\_LCM\_Blinky\_BL
- S5D9\_ex1\_timer
- S5D9\_ex2\_timer\_intr
- S5D9\_ex3\_uart\_send
- S5D9\_ex3a\_uart\_recieve
- S5D9\_ex3b\_uart\_rtoc\_sf
- S5D9\_ex4\_cpp
- S5D9\_ex5\_spi
- S5D9\_ex6\_spi\_sf\_rtoc
- S5D9\_ex7\_rspi\_sftx\_c0p2
- S5D9\_ex8\_sci\_sftx\_c0p2
- Includes
- src
- synergy
- script
- synergy\_cfg
- configuration.xml
- R7FS5D97E2A01CLK.pincfg
- S5D9\_ex8\_sci\_sftx\_c0p2 Debug.launch
- S5D9-IOT-Enabler.pincfg
- synergy\_cfg.txt
- S5D9\_I2C\_ENV210\_OLED\_SHT31\_v2\_Framework
- S5D9\_I2C\_ENV210\_OLED\_SHT31\_v2a\_Framework
- S5D9\_I2C\_ENV210\_OLED\_SHT31\_v2b\_Framework
- S5D9\_I2C\_ENV210\_OLED\_SHT31\_v2c\_Framework
- S5D9\_I2C\_ENV210\_OLED\_SHT31\_v2d\_Framework
- S5D9\_I2C\_ENV210\_OLED\_SHT31\_v2e\_Framework
- S5D9\_I2C\_EXT\_OLED\_v1
- S5D9\_I2C\_EXT\_OLED\_v2

Pins

Select pin configuration

S5D9-IOT-Enabler.pincfg ☒ Generate data: g\_bsp\_pin\_cfg

Pin Selection

type filter text

- Monitoring: CAC
- ✓ Analog: ADC
- ✓ Analog: CMP
- ✓ Analog: DAC12
- ✓ Connectivity: CAN
- ✓ Connectivity: ETHERC
- ✓ Connectivity: IIC
- ✓ Connectivity: SCI
  - ✓ SCI0
  - SCI1
  - SCI2
  - SCI3
  - SCI4
  - SCI5
  - SCI6
  - ✓ SCI7
  - SCI8
  - ✓ SCI9
- Connectivity: SPI

Pin Configuration

Module name: SCI9

Usage: When using Simple I2C mode, ensure port pins output type is n-ch open drain. When switching between I2C and other modes, first disable.

Pin Group Selection: Mixed

Operation Mode: Simple SPI

Input/Output

TXD\_MOSI: ✓ P203

RXD\_MISO: ✓ P202

SCK: ✓ P204

CTS\_RTS\_SS: None

SDA: None

SCL: None

Summary BSP Clocks Pins Threads Messaging ICU Components

Properties Problems

Properties are not available.

Pin Conflicts Console

<terminated> S5D9\_ex7\_rspi\_sftx\_c0p2 Debug [Renesas GDB Hardware Debugging] GDB server

Target connection status - OK

Starting download

Option Function Select, writing to address 0x00000400 with data ffffffff

SECMPUxxx, writing to address 0x00000408 with data ffffffff

Finished download

Hardware breakpoint set at address 0x45fe

Hardware breakpoint set at address 0x45fe

Hardware breakpoint set at address 0x45fe

Starting download

Option Function Select, writing to address 0x00000400 with data ffffffff

SECMPUxxx, writing to address 0x00000408 with data ffffffff

Finished download

Hardware breakpoint set at address 0x45fe

Hardware breakpoint set at address 0x45fe

Hardware breakpoint set at address 0x45fe

Disconnected from the Target Debugger.

# SSL0 P205 (GPIO)

The screenshot displays the Synergy Configuration tool interface for the project `SSD9_ex8_sci_spi_sftx_c0p2`. The **Project Explorer** on the left shows the project structure, including the `SSD9_ex8_sci_spi_sftx_c0p2` folder and its sub-components like `configuration.xml` and `R7F5SD97E2A01CLK.pincfg`.

The main **Pins** configuration window is active, showing the **Select pin configuration** dropdown set to `SSD9-IOT-Enabler.pincfg` and the **Generate data** checkbox checked. The **Pin Selection** list on the left shows pins P200 through P214, with P205 selected. The **Pin Configuration** table on the right lists various peripheral functions for each pin, including `OPSR: GTIV`, `SCI4: SDA`, `SCI4: TXD_MOSI`, `SCI9: CTS_RTS_SS`, `SDHI0: DAT3`, `SPI1: SSL0`, `SSI1: SSIWS`, and `USBFS0: OVRCURA`.

The **P205 Configuration** section shows the following settings:

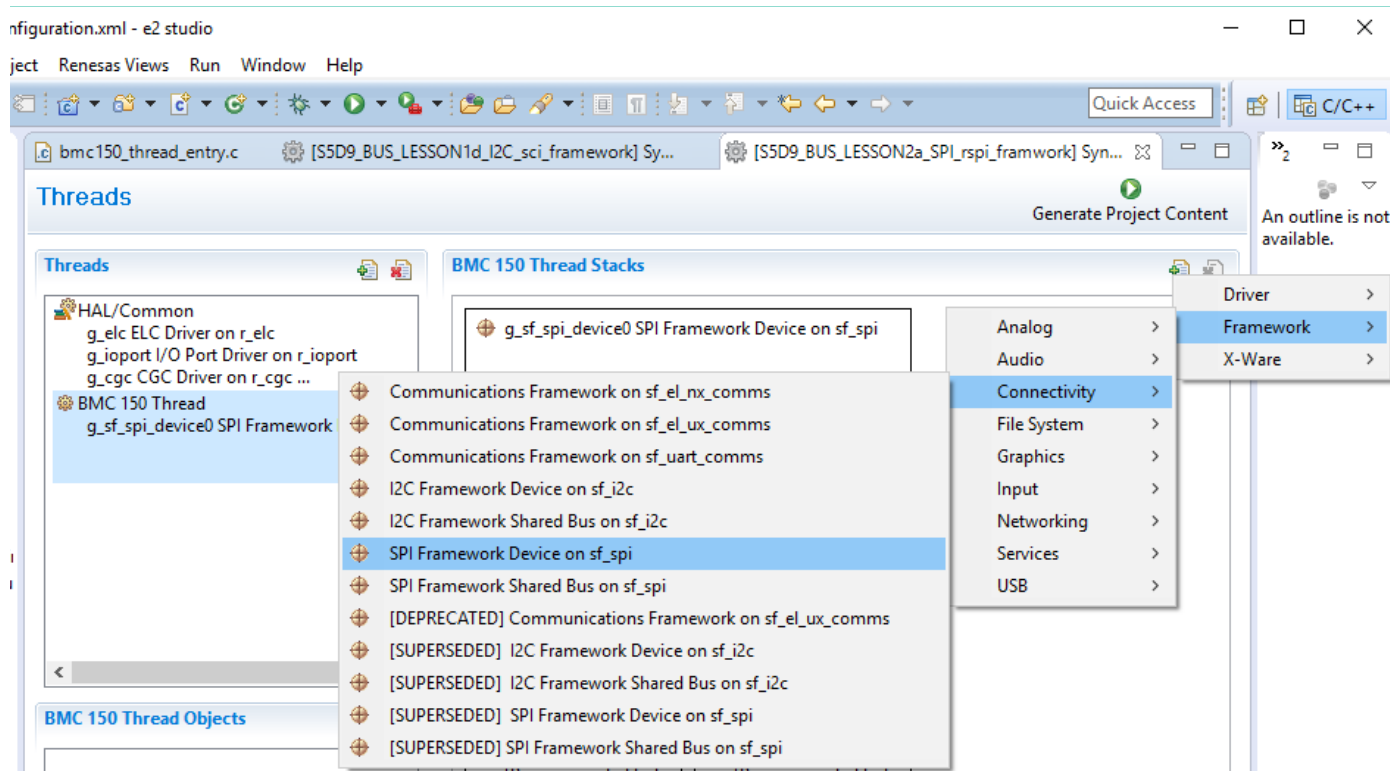
- Mode:** Output mode (Initial High)
- Pull up:** None
- IRQ:** None
- Drive Capacity:** Low
- Output type:** CMOS
- Chip input/output:** GPIO

The **Console** window at the bottom shows the GDB server output, indicating a successful connection and download of the program to the target device. The output includes messages such as `Target connection status - OK`, `Starting download`, and `Hardware breakpoint set at address 0x45fe`.

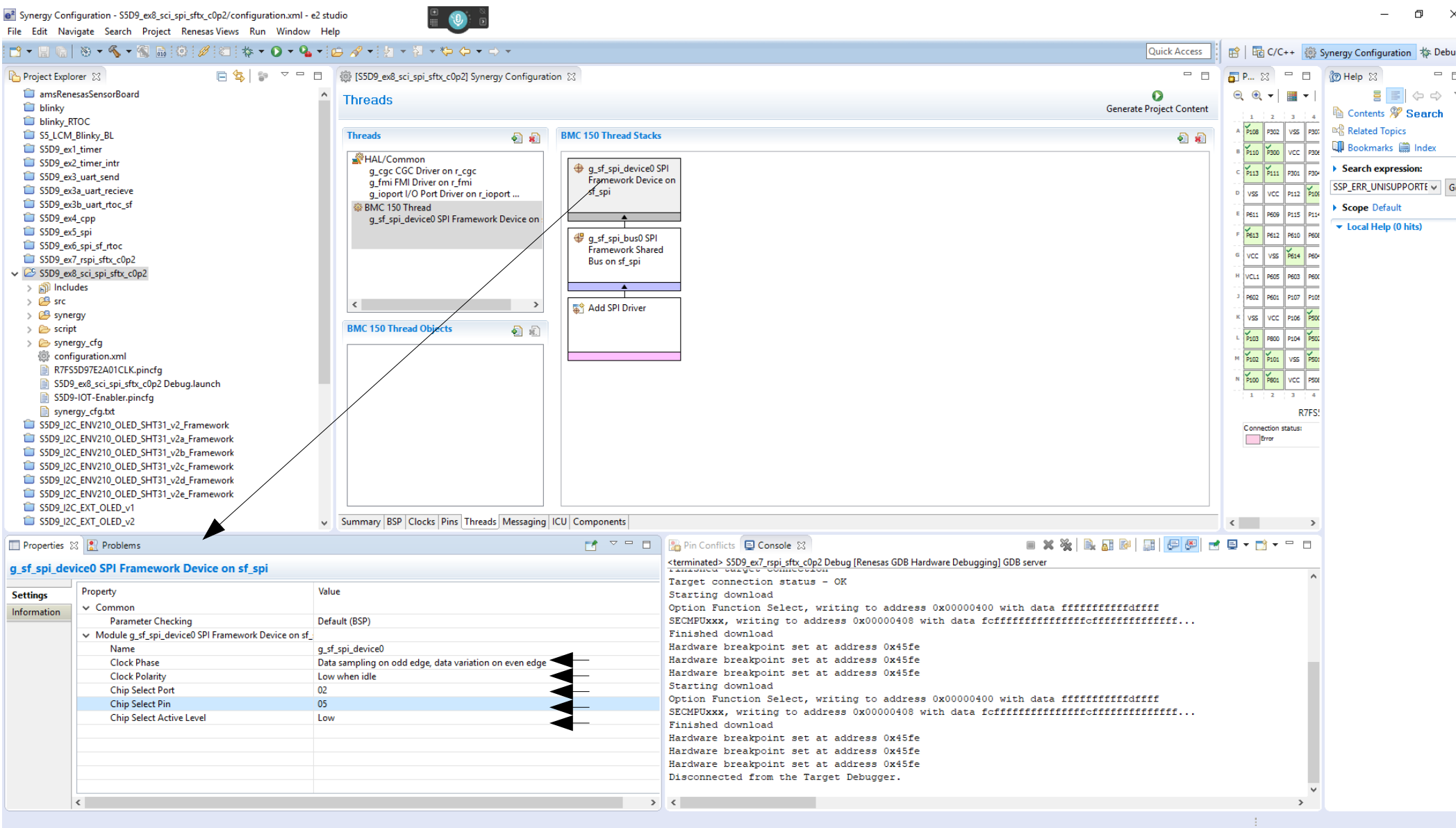




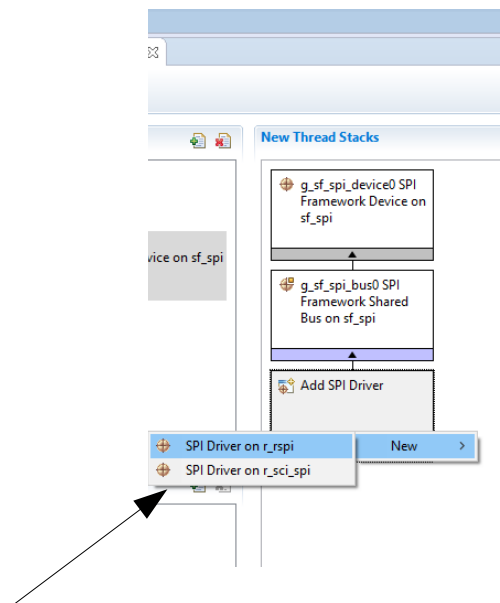
# Create a new Thread and SPI Framework Device



# Configure Chip Select



# Choose r\_sci\_spi driver for new



Choose the bottom one

# Configure the r\_sci\_spi driver

The screenshot displays the Synergy Configuration tool interface for the project [SSD9\_ex8\_sci\_sftx\_c0p2]. The main window shows the 'Threads' and 'BMC 150 Thread Stacks' sections. The 'BMC 150 Thread Objects' section is currently empty. The 'Properties' panel on the left shows the configuration for the 'g\_spi0 SPI Driver on r\_sci\_spi'.

**Properties Panel: g\_spi0 SPI Driver on r\_sci\_spi**

Property	Value
Common	
Parameter Checking	Default (BSP)
Module g_spi0 SPI Driver on r_sci_spi	
Name	g_spi0
Channel	9
Operating Mode	Master
Clock Phase	Data sampling on odd edge, data variation on even edge
Clock Polarity	Low when idle
Mode Fault Error	Disable
Bit Order	MSB First
Bitrate	100000
Bit Rate Modulation Enable	Enable
Callback	NULL
Receive Interrupt Priority	Priority 2
Transmit Interrupt Priority	Priority 2
Transmit End Interrupt Priority	Priority 2
Error Interrupt Priority	Priority 2

**Console Output:**

```
<terminated> SSD9_ex7_rspi_sftx_c0p2 Debug [Renesas GDB Hardware Debugging] GDB server
GDBServer endian : little
Target power : off
Starting target connection
Finished target connection
Target connection status - OK
Starting download
Option Function Select, writing to address 0x00000400 with data ffffffff
SECMPUxxx, writing to address 0x00000408 with data ffffffff
Finished download
Hardware breakpoint set at address 0x45fe
Hardware breakpoint set at address 0x45fe
Hardware breakpoint set at address 0x45fe
Starting download
Option Function Select, writing to address 0x00000400 with data ffffffff
SECMPUxxx, writing to address 0x00000408 with data ffffffff
Finished download
Hardware breakpoint set at address 0x45fe
Hardware breakpoint set at address 0x45fe
Hardware breakpoint set at address 0x45fe
Disconnected from the Target Debugger.
```

**Annotations:**

- An arrow points to the 'Channel' property, which is set to 9.
- Text: "Use channel 9 since SCI9 is configured for the SPI port"

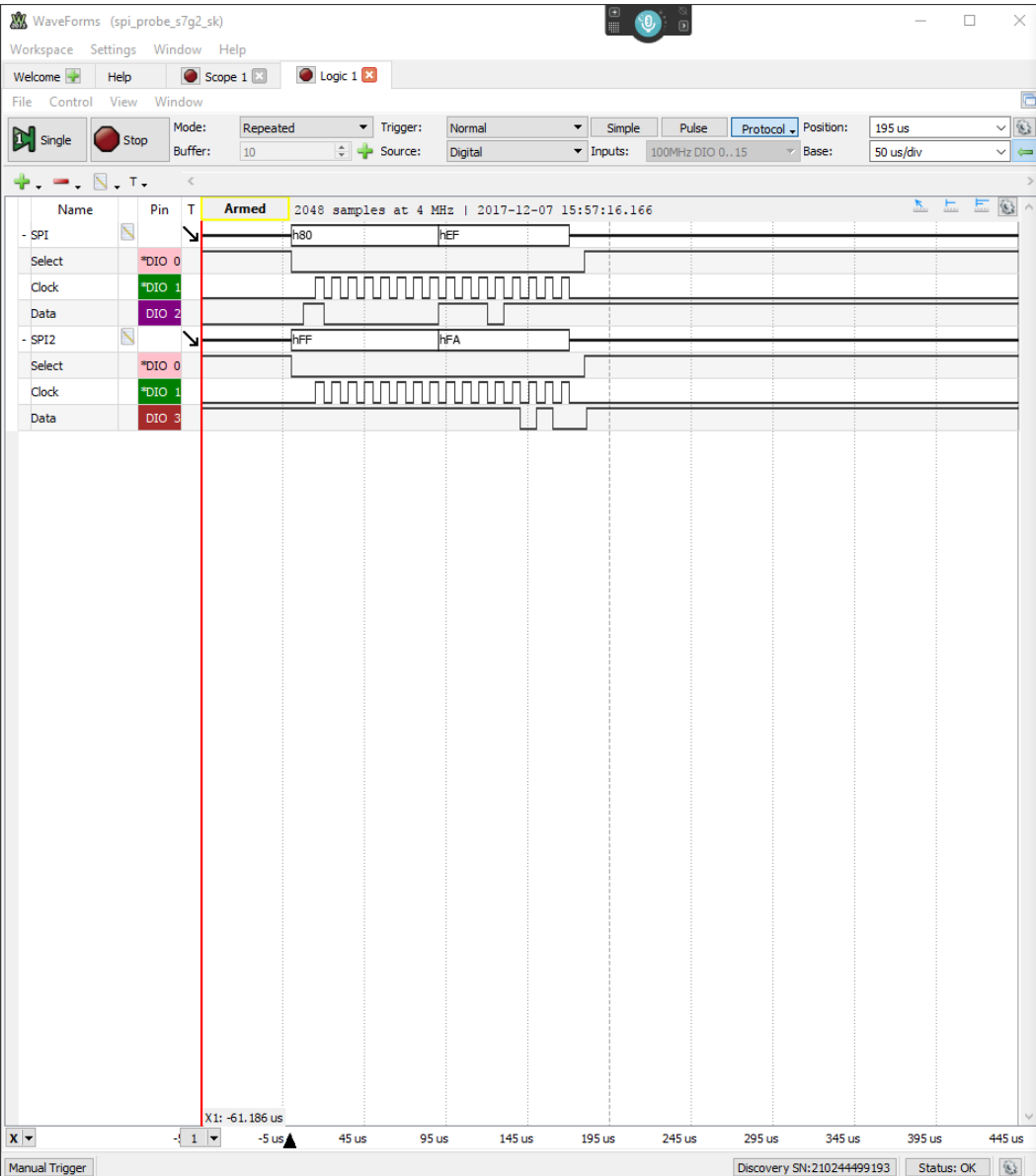




# Main Code

```
18
19
20
21  */
22  #include "bmc150_thread.h"
23
24  int count = 0;
25
26  /* BMC 150 Thread entry function */
27  void bmc150_thread_entry(void)
28  {
29      char buf[20];
30      ssp_err_t err;
31
32      g_ioport.p_api->pinWrite(IOPORT_PORT_01_PIN_13, false);
33
34      //read acceleration
35      err = g_sf_spi_device0.p_api->open(g_sf_spi_device0.p_ctrl, g_sf_spi_device0.p_cfg);
36      if (err)
37          g_ioport.p_api->pinWrite(IOPORT_PORT_01_PIN_13, true);
38
39      while (1)
40      {
41          // read XYZ value
42          buf[0] = (char)(0x80 | 0x02);
43          //buf[0] = (char)(0x80 | 0x00);
44          err = g_sf_spi_device0.p_api->writeRead(g_sf_spi_device0.p_ctrl, buf, &buf[7], 7, SPI_BIT_WIDTH_8_BITS, TX_WAIT);
45          if (err)
46              g_ioport.p_api->pinWrite(IOPORT_PORT_01_PIN_13, true);
47
48          //read chip id
49          buf[0] = (char)(0x80 | 0x00);
50          err = g_sf_spi_device0.p_api->writeRead(g_sf_spi_device0.p_ctrl, buf, &buf[7], 2, SPI_BIT_WIDTH_8_BITS, TX_WAIT);
51          if (err)
52              g_ioport.p_api->pinWrite(IOPORT_PORT_01_PIN_13, true);
53
54          //read temperature
55          buf[0] = (char)(0x80 | 0x08);
56          err = g_sf_spi_device0.p_api->writeRead(g_sf_spi_device0.p_ctrl, buf, &buf[7], 2, SPI_BIT_WIDTH_8_BITS, TX_WAIT);
57          if (err)
58              g_ioport.p_api->pinWrite(IOPORT_PORT_01_PIN_13, true);
59
60          tx_thread_sleep(10);
61          count++;
62      }
63  }
64
65
```

# Read ID Example (0xFA)



The screenshot displays the Renesas e2\_studio IDE interface during a GDB debug session. The top menu bar includes File, Edit, Source, Refactor, Navigate, Search, Project, Renesas Views, Run, Window, and Help. The toolbar contains various icons for file operations, navigation, and execution. The left sidebar shows the project structure with files like SSD9\_ex8\_sci\_spi\_sftx\_c0p2 and Thread #1. The top center panel displays a list of variables and their values, including 'err' which is 'SSP\_SUCCESS'. The bottom center panel shows the source code for 'bmc150\_thread\_entry.c' with a green highlight on the 'if (err)' statement. The bottom right panel shows the console output with messages like 'Unexpected vCont reply in non-stop mode: E31'.