S5D9 SPI Bus Example
(R_SPI Framework Version)
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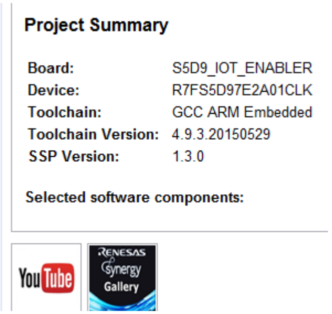
(2/2/2018)
https://www.miketechuniverse.com

E2 Studio 5.4.0.023
SSP 1.3.0

s5d9_lab_spi (PMOD)

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

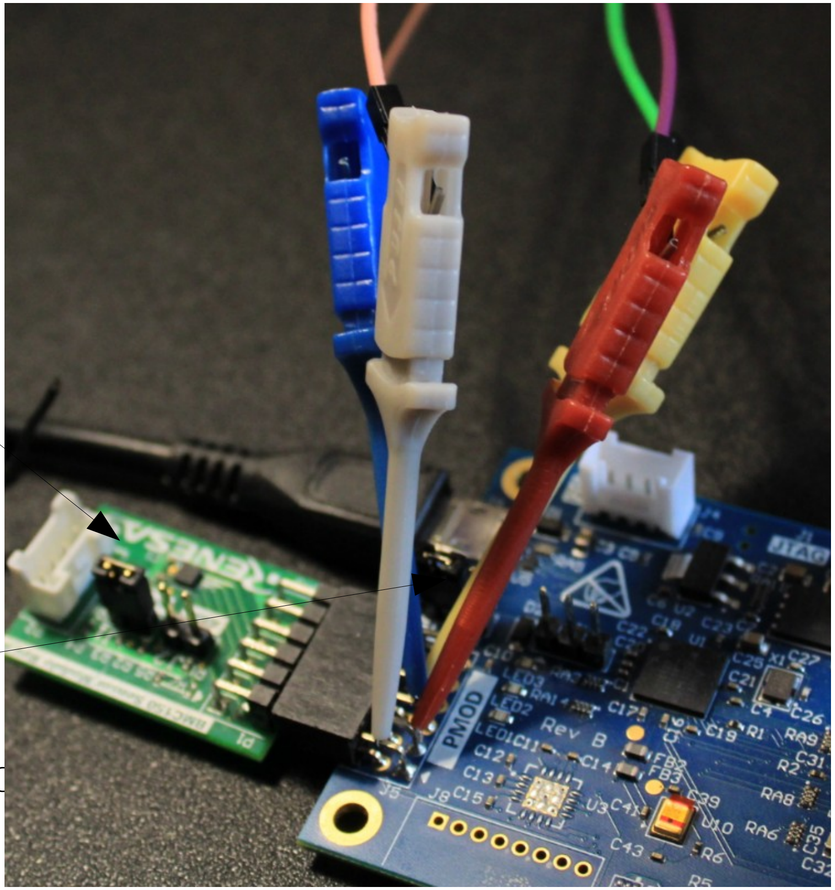


Project Summary

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

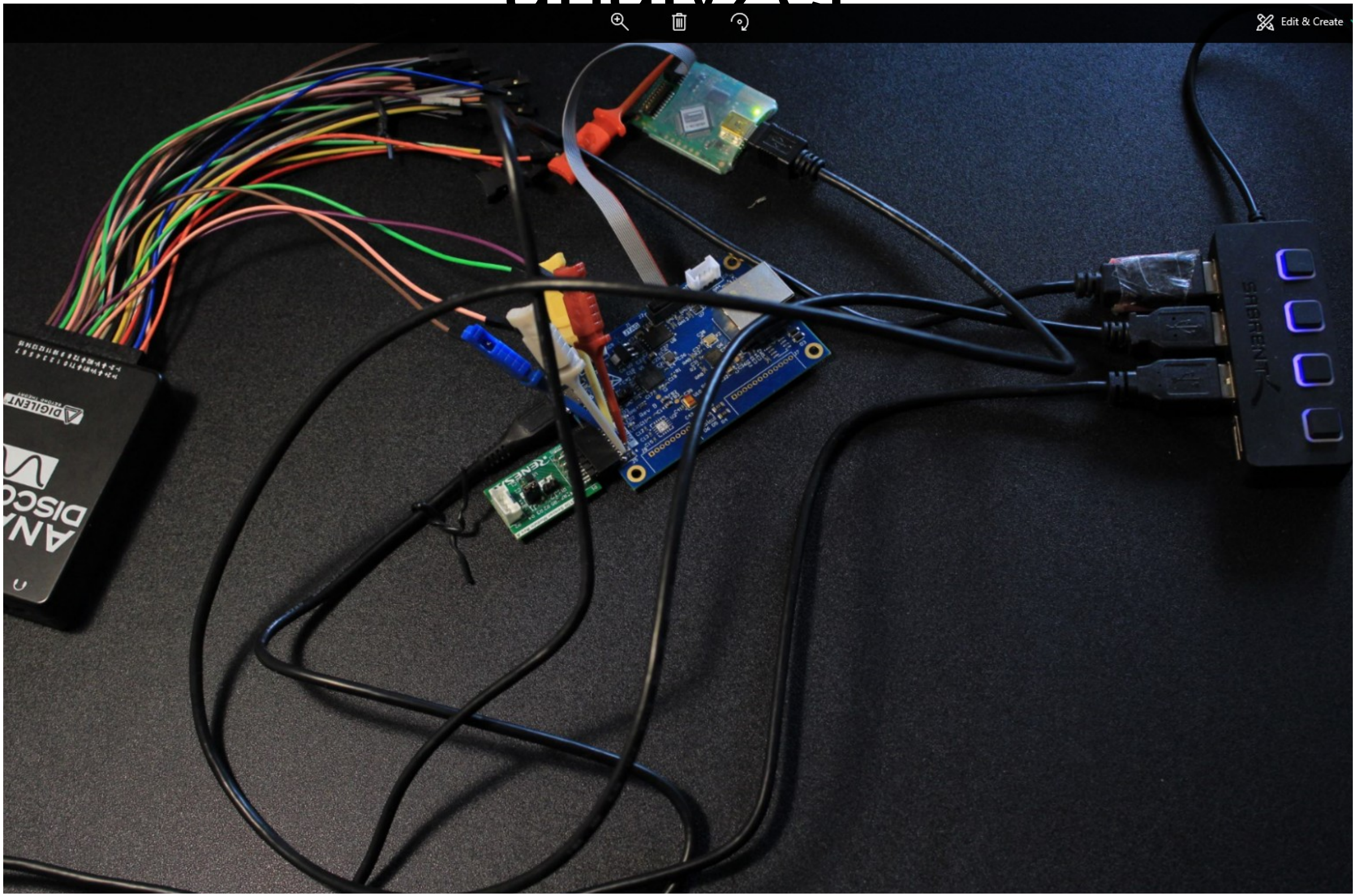


D0 P1 CSB
D2 P2 MOSI
D3 P3 MISO
D1 P4 CK
P5 GND
P6 VCC = 3.3V (due to JMP)

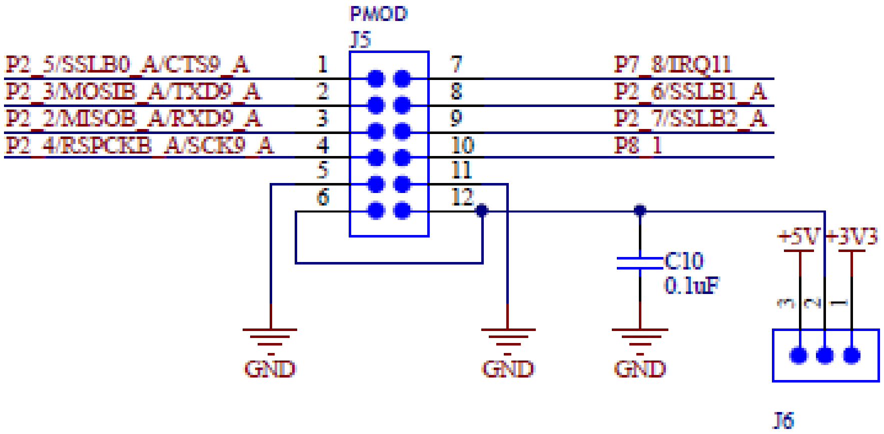
SPI Example by Michael C

Px = PMOD pin, Dx = Scope pin

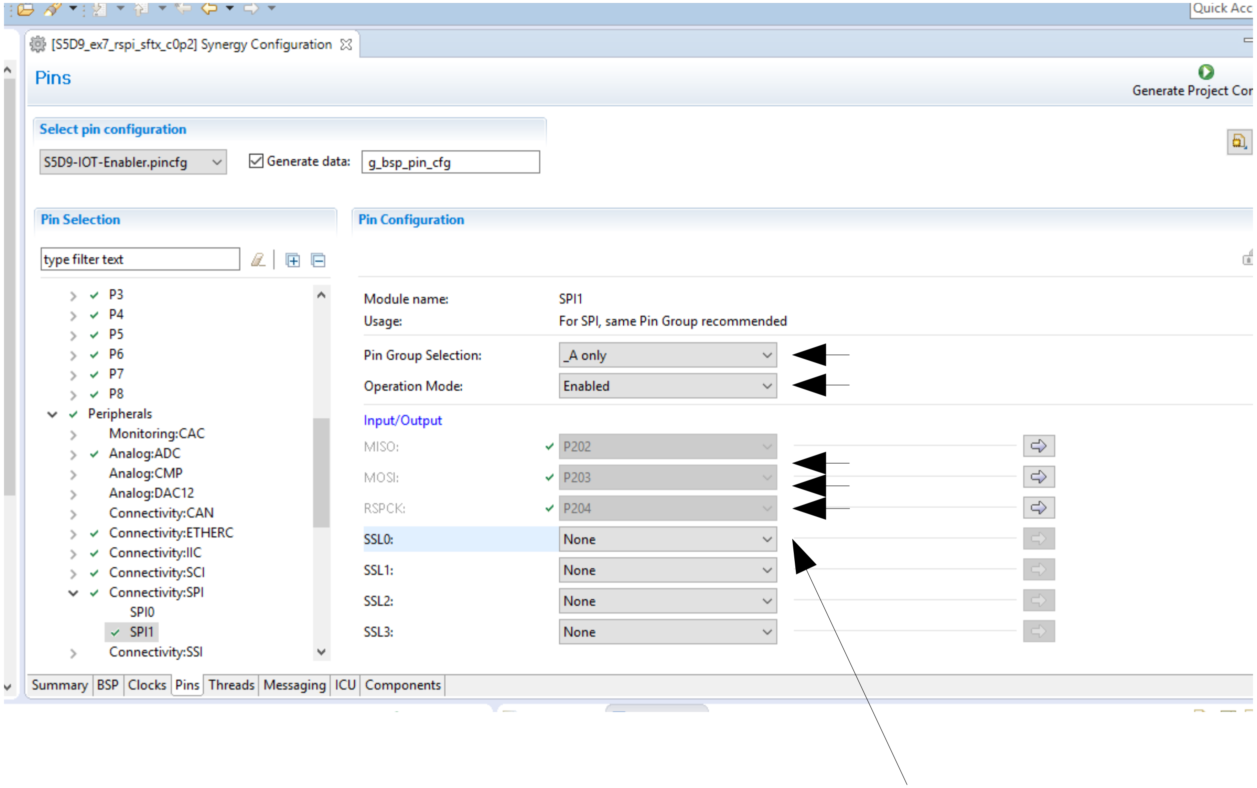
The complete setup with the logic analyzer



PMOD Schematic



SPI1 (channel 1 !!!)



[S5D9_ex7_rspi_sftx_c0p2] Synergy Configuration

Pins

Select pin configuration

S5D9-IOT-Enabler.pincfg

☑ Generate data: g_bsp_pin_cfg

Pin Configuration

Module name: SPI1

Usage: For SPI, same Pin Group recommended

Pin Group Selection: _A only

Operation Mode: Enabled

Input/Output

MISO: ✓ P202

MOSI: ✓ P203

RSPCK: ✓ P204

SSL0: None

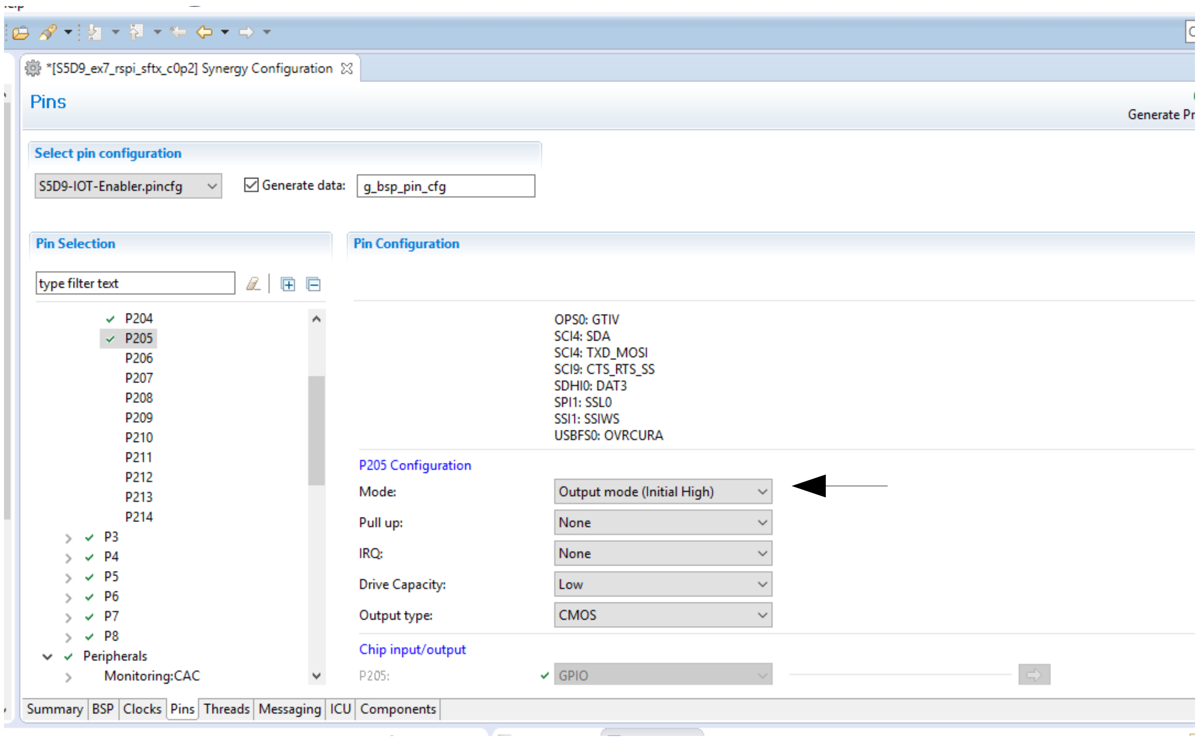
SSL1: None

SSL2: None

SSL3: None

SSL0 is set to None because P2_5 will be controlled separately as a GPIO output pin.

SSL0 (GPIO output mode)



Select pin configuration

S5D9-IOT-Enabler.pincfg ☑ Generate data: g_bsp_pin_cfg

Pin Selection

- ✓ P204
- ✓ P205
- P206
- P207
- P208
- P209
- P210
- P211
- P212
- P213
- P214
- ✓ P3
- ✓ P4
- ✓ P5
- ✓ P6
- ✓ P7
- ✓ P8
- ✓ Peripherals
  - Monitoring:CAC

Pin Configuration

OPS0: GTIV
SCI4: SDA
SCI4: TXD_MOSI
SCI9: CTS_RTS_SS
SDHI0: DAT3
SPI1: SSL0
SSI1: SSIWS
USBFS0: OVRCURA

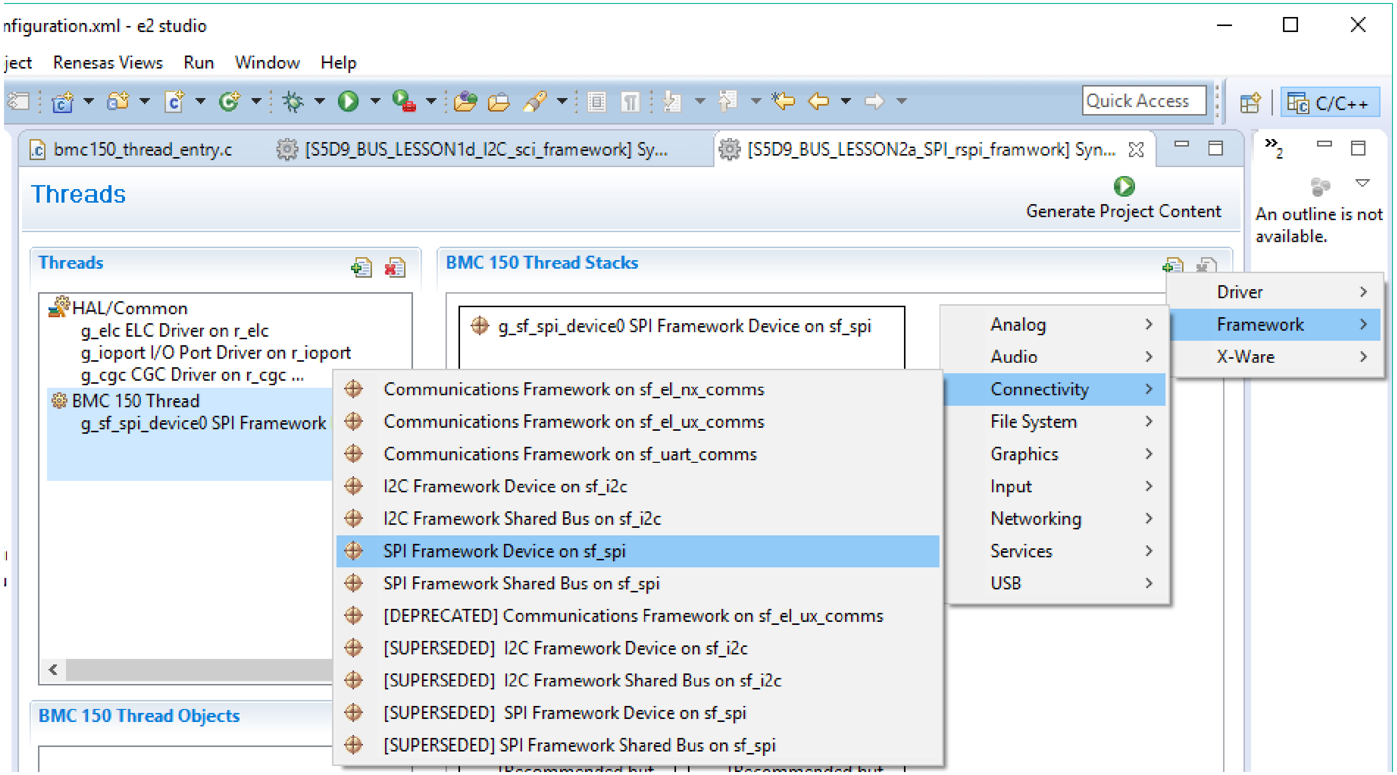
P205 Configuration

Mode:	Output mode (Initial High) ←
Pull up:	None
IRQ:	None
Drive Capacity:	Low
Output type:	CMOS

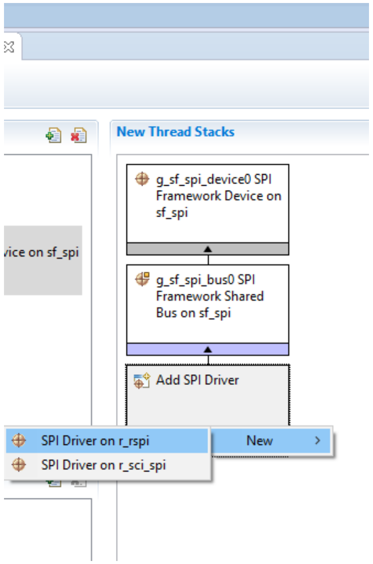
Chip input/output

P205: ✓ GPIO

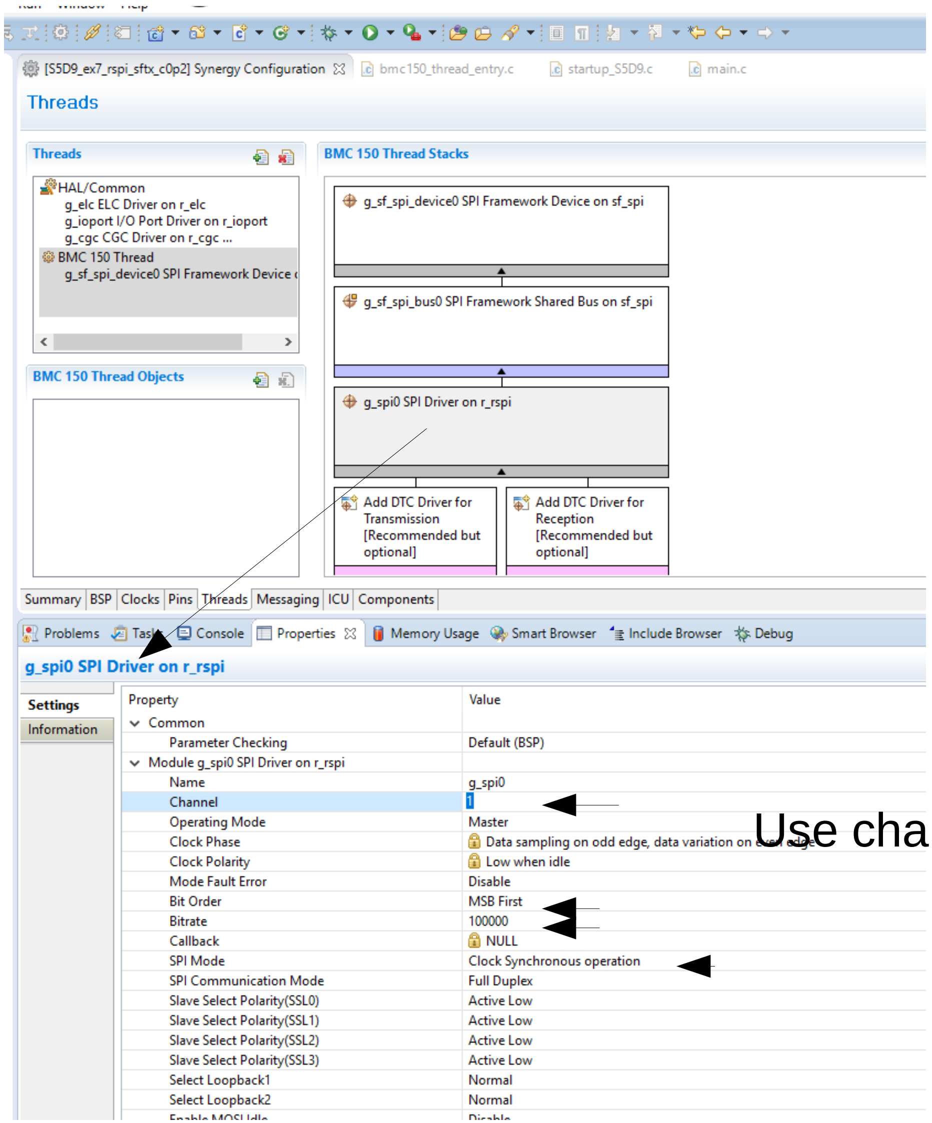
Create a new Thread and SPI Framework Device


nfiguration.xml - e2 studio
ject Renesas Views Run Window Help
Quick Access
C/C++
bmc150_thread_entry.c
[S5D9_BUS_LESSON1d_I2C_sci_framework] Sy...
[S5D9_BUS_LESSON2a_SPI_rspi_framwork] Syn...
Threads
Generate Project Content
An outline is not available.
Threads
HAL/Common
g_elc ELC Driver on r_elc
g_ioport I/O Port Driver on r_ioport
g_cgc CGC Driver on r_cgc ...
BMC 150 Thread
g_sf_spi_device0 SPI Framework
BMC 150 Thread Stacks
g_sf_spi_device0 SPI Framework Device on sf_spi
BMC 150 Thread Objects
Driver
Framework
X-Ware
Analog
Audio
Connectivity
File System
Graphics
Input
Networking
Services
USB
Communications Framework on sf_el_nx_comms
Communications Framework on sf_el_ux_comms
Communications Framework on sf_uart_comms
I2C Framework Device on sf_i2c
I2C Framework Shared Bus on sf_i2c
SPI Framework Device on sf_spi
SPI Framework Shared Bus on sf_spi
[DEPRECATED] Communications Framework on sf_el_ux_comms
[SUPERSEDED] I2C Framework Device on sf_i2c
[SUPERSEDED] I2C Framework Shared Bus on sf_i2c
[SUPERSEDED] SPI Framework Device on sf_spi
[SUPERSEDED] SPI Framework Shared Bus on sf_spi

Choose r_rspi driver for new


New Thread Stacks
g_sf_spi_device0 SPI Framework Device on sf_spi
vice on sf_spi
g_sf_spi_bus0 SPI Framework Shared Bus on sf_spi
Add SPI Driver
SPI Driver on r_rspi
SPI Driver on r_sci_spi
New

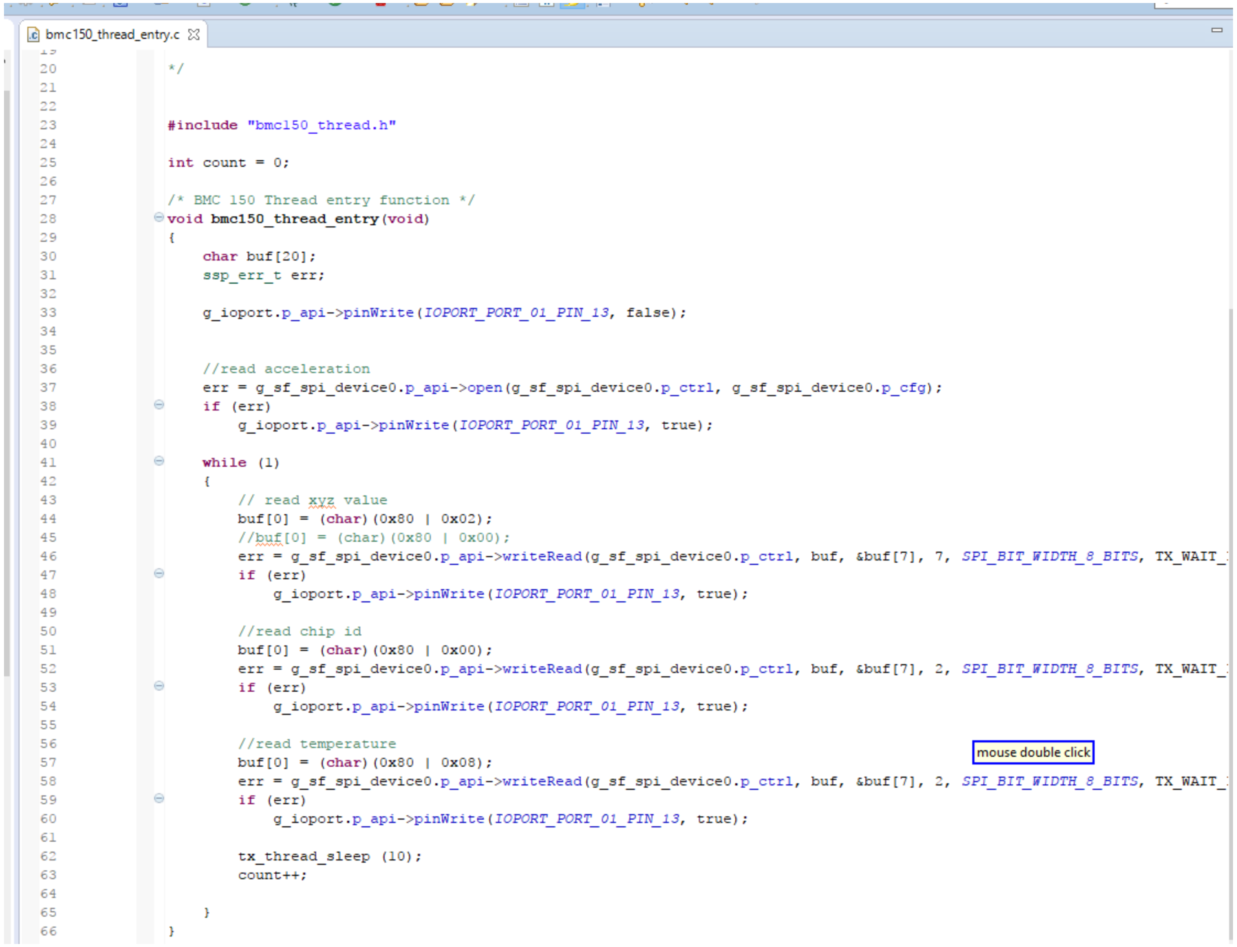
Change Properties


[S5D9_ex7_rspi_sftx_c0p2] Synergy Configuration
bmc150_thread_entry.c
startup_S5D9.c
main.c
Threads
Threads
HAL/Common
g_elc ELC Driver on r_elc
g_ioport I/O Port Driver on r_ioport
g_cgc CGC Driver on r_cgc ...
BMC 150 Thread
g_sf_spi_device0 SPI Framework Device
BMC 150 Thread Objects
BMC 150 Thread Stacks
g_sf_spi_device0 SPI Framework Device on sf_spi
g_sf_spi_bus0 SPI Framework Shared Bus on sf_spi
g_spi0 SPI Driver on r_rspi
Add DTC Driver for Transmission [Recommended but optional]
Add DTC Driver for Reception [Recommended but optional]
Summary
BSP
Clocks
Pins
Threads
Messaging
ICU
Components
Problems
Tasks
Console
Properties
Memory Usage
Smart Browser
Include Browser
Debug
g_spi0 SPI Driver on r_rspi
Settings
Information

Property	Value
Common	
Parameter Checking	Default (BSP)
Module g_spi0 SPI Driver on r_rspi	
Name	g_spi0
Channel	1
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
Callback	NULL
SPI Mode	Clock Synchronous operation
SPI Communication Mode	Full Duplex
Slave Select Polarity(SSL0)	Active Low
Slave Select Polarity(SSL1)	Active Low
Slave Select Polarity(SSL2)	Active Low
Slave Select Polarity(SSL3)	Active Low
Select Loopback1	Normal
Select Loopback2	Normal
Enable MOSI Idle	Disable

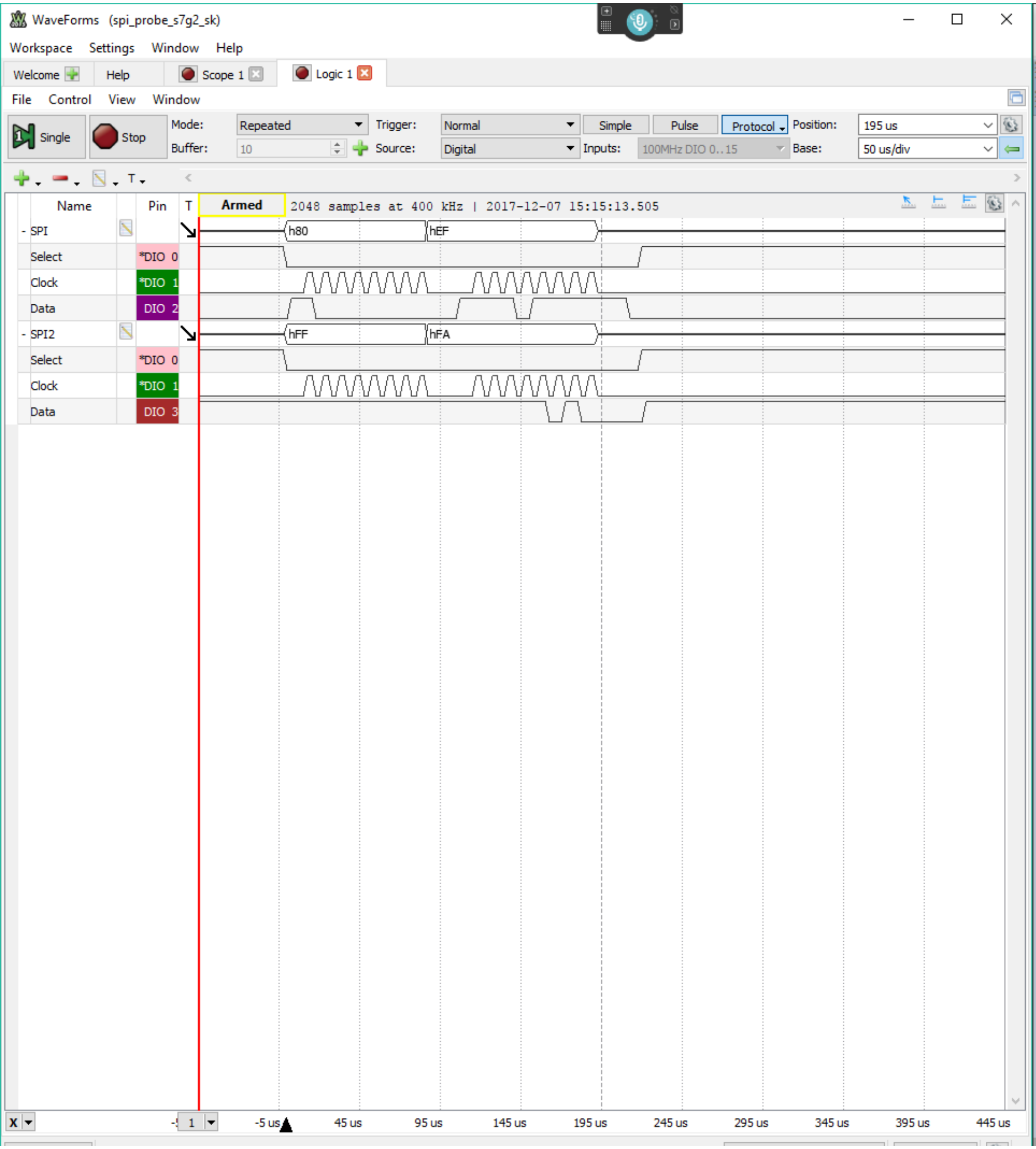
Use channel 1 since SPI1 is used

Main Code



```c
*/


#include "bmc150_thread.h"

int count = 0;

/* BMC 150 Thread entry function */
void bmc150_thread_entry(void)
{
    char buf[20];
    ssp_err_t err;

    g_ioport.p_api->pinWrite(IOPORT_PORT_01_PIN_13, false);


    //read acceleration
    err = g_sf_spi_device0.p_api->open(g_sf_spi_device0.p_ctrl, g_sf_spi_device0.p_cfg);
    if (err)
        g_ioport.p_api->pinWrite(IOPORT_PORT_01_PIN_13, true);

    while (1)
    {
        // read xyz value
        buf[0] = (char)(0x80 | 0x02);
        //buf[0] = (char)(0x80 | 0x00);
        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_
        if (err)
            g_ioport.p_api->pinWrite(IOPORT_PORT_01_PIN_13, true);

        //read chip id
        buf[0] = (char)(0x80 | 0x00);
        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_
        if (err)
            g_ioport.p_api->pinWrite(IOPORT_PORT_01_PIN_13, true);

        //read temperature
        buf[0] = (char)(0x80 | 0x08);
        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_
        if (err)
            g_ioport.p_api->pinWrite(IOPORT_PORT_01_PIN_13, true);

        tx_thread_sleep (10);
        count++;

    }
}
```

ID Read

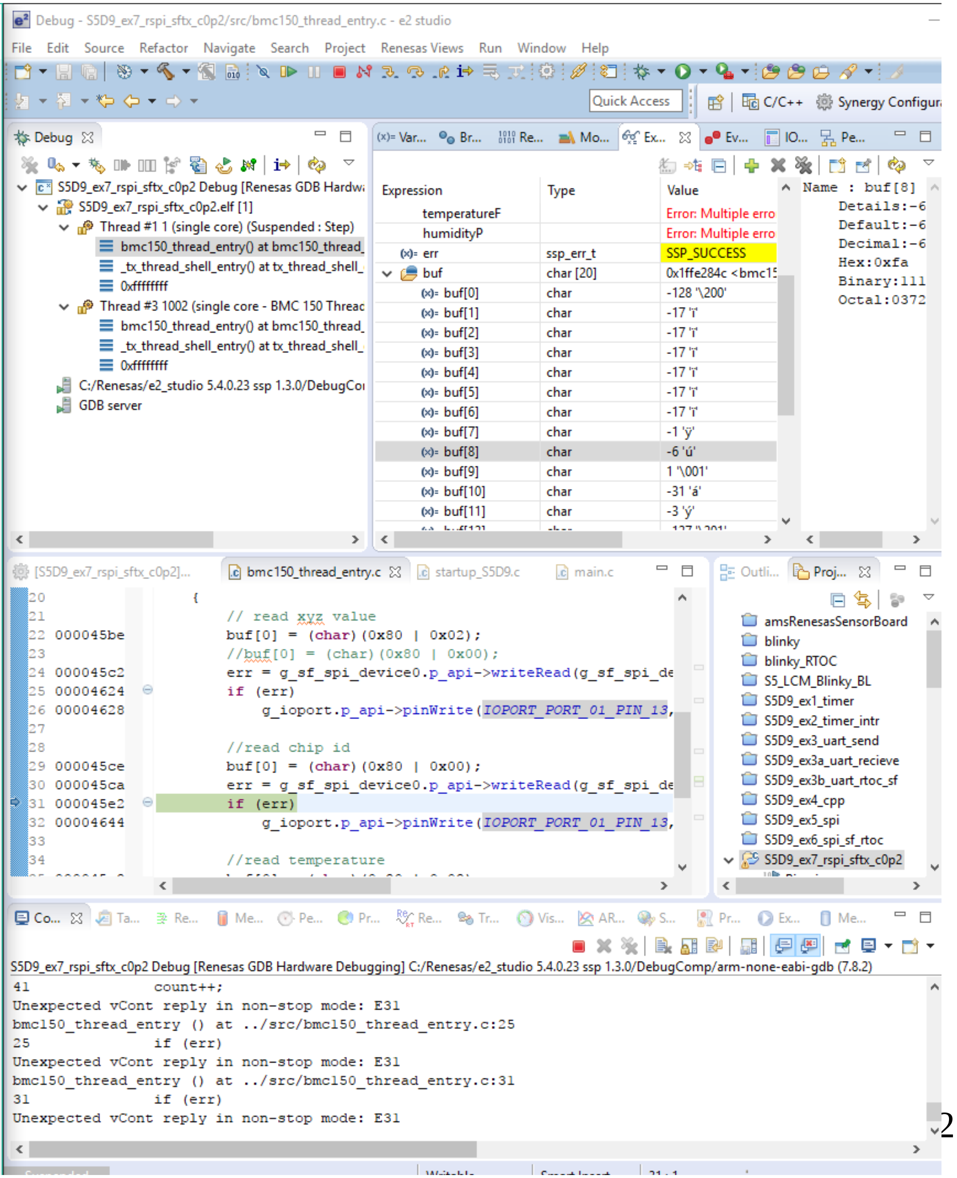


WaveForms (spi_probe_s7g2_sk)

Mode: Repeated
Trigger: Normal
Position: 195 us
Buffer: 10
Source: Digital
Inputs: 100MHz DIO 0..15
Base: 50 us/div

Armed | 2048 samples at 400 kHz | 2017-12-07 15:15:13.505

Name	Pin
SPI	
Select	DIO 0
Clock	DIO 1
Data	DIO 2
SPI2	
Select	DIO 0
Clock	DIO 1
Data	DIO 3



Debug - S5D9_ex7_rspi_sftx_c0p2/src/bmc150_thread_entry.c - e2 studio

S5D9_ex7_rspi_sftx_c0p2 Debug [Renesas GDB Hardware Debugging]
S5D9_ex7_rspi_sftx_c0p2.elf [1]
Thread #1 1 (single core) (Suspended : Step)
bmc150_thread_entry() at bmc150_thread_
_tx_thread_shell_entry() at tx_thread_shell_
0xffffffff
Thread #3 1002 (single core - BMC 150 Threac
bmc150_thread_entry() at bmc150_thread_
_tx_thread_shell_entry() at tx_thread_shell_
0xffffffff
C:/Renesas/e2_studio 5.4.0.23 ssp 1.3.0/DebugCor
GDB server

Expression	Type	Value
temperatureF		Error: Multiple erro
humidityP		Error: Multiple erro
err	ssp_err_t	SSP_SUCCESS
buf	char [20]	0x1ffe284c <bmc15
buf[0]	char	-128 '\200'
buf[1]	char	-17 'ï'
buf[2]	char	-17 'ï'
buf[3]	char	-17 'ï'
buf[4]	char	-17 'ï'
buf[5]	char	-17 'ï'
buf[6]	char	-17 'ï'
buf[7]	char	-1 'ÿ'
buf[8]	char	-6 'ú'
buf[9]	char	1 '\001'
buf[10]	char	-31 'á'
buf[11]	char	-3 'ý'

```
Name : buf[8]
    Details:-6
    Default:-6
    Decimal:-6
    Hex:0xfa
    Binary:111
    Octal:0372
```

bmc150_thread_entry.c

```
                  {
                      // read xyz value
000045be              buf[0] = (char)(0x80 | 0x02);
                      //buf[0] = (char)(0x80 | 0x00);
000045c2              err = g_sf_spi_device0.p_api->writeRead(g_sf_spi_de
00004624              if (err)
00004628                  g_ioport.p_api->pinWrite(IOPORT_PORT_01_PIN_13,

                      //read chip id
000045ce              buf[0] = (char)(0x80 | 0x00);
000045ca              err = g_sf_spi_device0.p_api->writeRead(g_sf_spi_de
000045e2              if (err)
00004644                  g_ioport.p_api->pinWrite(IOPORT_PORT_01_PIN_13,

                      //read temperature
```

S5D9_ex7_rspi_sftx_c0p2 Debug [Renesas GDB Hardware Debugging] C:/Renesas/e2_studio 5.4.0.23 ssp 1.3.0/DebugComp/arm-none-eabi-gdb (7.8.2)

```
41              count++;
Unexpected vCont reply in non-stop mode: E31
bmc150_thread_entry () at ../src/bmc150_thread_entry.c:25
25              if (err)
Unexpected vCont reply in non-stop mode: E31
bmc150_thread_entry () at ../src/bmc150_thread_entry.c:31
31              if (err)
Unexpected vCont reply in non-stop mode: E31
```