

# Customer training workshop: HAL\_SPI\_Master for KIT\_T2G-B-H\_EVK

TRAVEO™ T2G CYT4BF series Microcontroller Training  
V1.0.1 2023-02



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## Scope of work

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- › This code example demonstrates the use of a SPI (HAL) resource in master mode. The SPI master is configured to send command packets to control a user LED on the slave. Both the slave and the master are on the same device.
  
- › Device
  - The TRAVEO™ T2G CYT4BFBCH device is used in this code example.
  
- › Board
  - The TRAVEO™ T2G KIT\_T2G-B-H\_EVK board is used for testing.

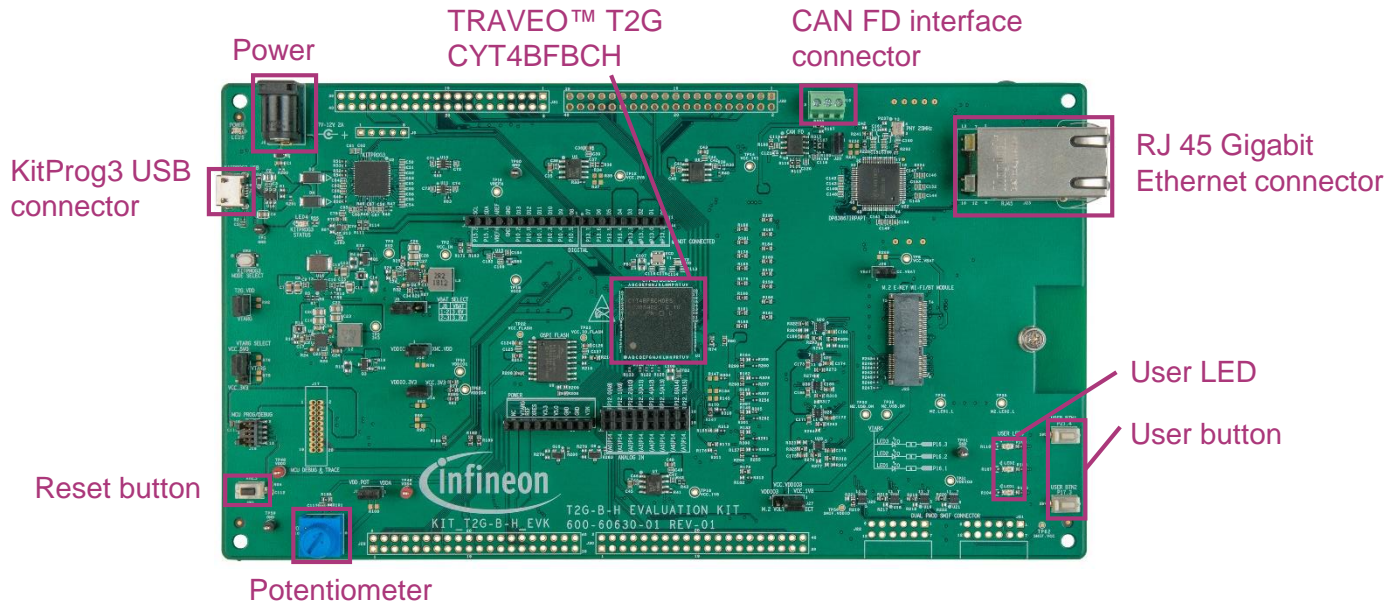
# Introduction

## › **Serial Communications Block (SCB ) has the following features:**

- Standard SPI master and slave functionality with Motorola, Texas Instruments, and National Semiconductor protocols
- Standard UART functionality with SmartCard reader, local interconnect network (LIN), and IrDA protocols
  - Standard LIN slave functionality with LIN v1.3 and LIN v2.1/2.2 specification compliance  
The SCB has only standard LIN slave functionality.
- Standard I2C master and slave functionality
- EZ mode for SPI and I2C slaves; allows operation without CPU intervention
- CMD\_RESP mode for SPI and I2C slaves; allows operation without CPU intervention and is available only on DeepSleep-capable SCB
- Low-power (DeepSleep) mode of operation for SPI and I2C slaves (using external clocking), available only on DeepSleep-capable SCB
- DeepSleep wakeup on I2C slave address match or SPI slave selection; available only on DeepSleep-capable SCB
- Trigger outputs for connection to DMA
- Multiple interrupt sources to indicate status of FIFOs and transfers
- Local loop-back control

# Hardware setup

- › This code example has been developed for the KIT-T2G-B-H-EVK board.
- › Connect your PC to the board using the provided USB cable through the KitProg3 USB connector.



# Implementation

## › Code example design

- The MCU controls both the master and the slave SPI resources. You can configure this example to operate in both master and slave SPI modes so that you can run this example using a single kit if that the kit supports two SPI ports on its I/O header.
- The master sends a packet to the slave with a command to turn ON or turn OFF the user LED. The packets are sent at an interval of 1 second. The slave receives the packet and controls the user LED per the command.

## **Follow these steps to configure this code example:**

- › STDOUT setting
- › GPIO port pin initialization
- › Configure SPI master / slave
- › Transmitting / Receiving data

## **STDOUT setting**

- › Call the [cy\\_retarget\\_io\\_init\(\)](#) function to use UART as STDOUT.
  - Initialize P13.1 as UART TX, P13.0 as UART RX (these pins are connected to KitProg3 COM port)
  - The serial port parameters becomes to 8N1 and 115200 baud

## Implementation (contd.)

### GPIO port pin initialization

- › The [cyhal\\_gpio\\_init\(\)](#) function initializes the GPIO port pin once.
  - Initialize P16.1 as output (initial level = H, LED turns off)

### Configure SPI master / slave

- › Call the [cyhal\\_spi\\_init\(\)](#) function to initialize as master / slave.
  - The SCB channel to be used is automatically allocated
  - The pins to be used are fixed based on the board design
    - **Master** : `KIT_SPI_MASTER_MOSI / KIT_SPI_MASTER_MISO / KIT_SPI_MASTER_SCLK / KIT_SPI_MASTER_SS`
    - **Slave** : `KIT_SPI_SLAVE_MOSI / KIT_SPI_SLAVE_MISO / KIT_SPI_SLAVE_SCLK / KIT_SPI_SLAVE_SS`
- › Call the [cyhal\\_spi\\_set\\_frequency\(\)](#) function to initialize baud rate of each channel.
  - The cycle can be changed by `SPI_FREQ_HZ`

## Implementation (contd.)

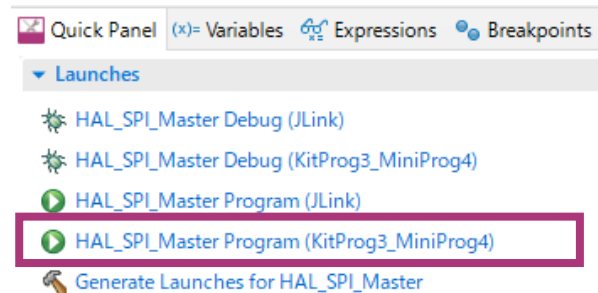
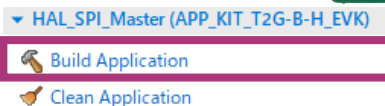
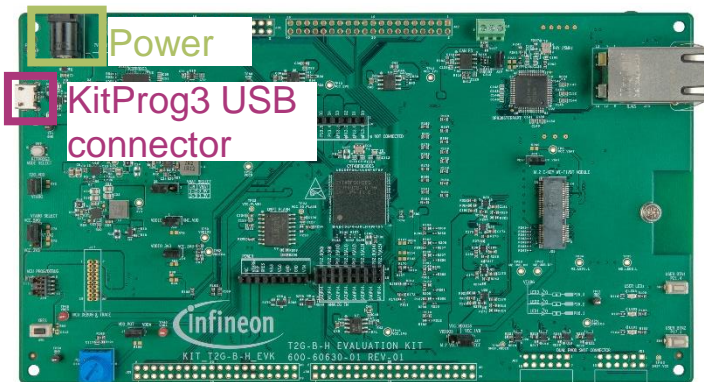
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### Transmitting / Receiving data

- › Call the [cyhal\\_spi\\_send\(\)](#) function to transmit via SPI as master.
  - The data to be transmitted specifies the next state so that the user LED can be toggled
- › Call the [cyhal\\_spi\\_recv\(\)](#) function to receive data from master as slave.
  - The received data is reflected to the user LED by calling [cyhal\\_gpio\\_write\(\)](#)

# Compiling and programming

1. Connect to power and USB cable
2. Use Eclipse IDE for ModusToolbox™ software for compiling and programming
3. Compile
  - a) Select the target application project in the Project Explorer.
  - b) In the Quick Panel, scroll down, and click “Build HAL\_SPI\_Master Application” in HAL\_SPI\_Master (KIT-T2G-B-H-EVK)
4. Open a terminal program and select the KitProg3 COM port. Set the serial port parameters to 8N1 and 115200 baud.
5. Programming
  - a) Select the target application project in the Project Explorer
  - b) In the Quick Panel, scroll down, and click “HAL\_SPI\_Master Program (KitProg3\_MiniProg4)” under Launches

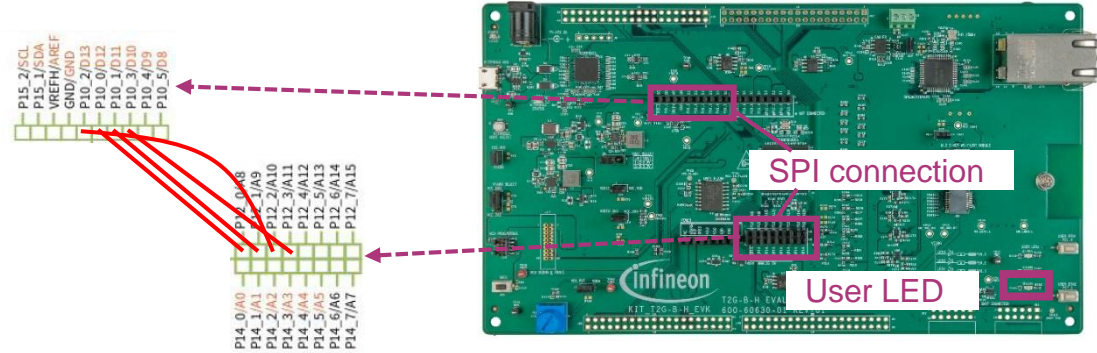




# Run and test

- To establish SPI connection between master and slave on the kit, use jumper wires as following on the board:

MOSI	P10.1	<->	P12.1
MISO	P10.0	<->	P12.0
SCLK	P10.2	<->	P12.2
SS	P10.3	<->	P12.3



- After programming, the application starts automatically. Confirm that the UART terminal displays as follows:

```

COM6 - Tera Term VT
File Edit Setup Control Window KanjiCode Help
*****
HAL: SPI Master
*****
Configuring SPI master...
Configuring SPI slave...
  
```

- Observe that the user LED turns ON/OFF every 1 second.

# References

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## Datasheet

- › [CYT4BF datasheet 32-bit Arm® Cortex®-M7 microcontroller TRAVEO™ T2G family](#)

## Architecture technical reference manual

- › [TRAVEO™ T2G automotive body controller high family architecture technical reference manual](#)

## Registers technical reference manual

- › [TRAVEO™ T2G automotive body controller high registers technical reference manual](#)

## PDL/HAL

- › [PDL](#)

- › [HAL](#)

## Training

- › [TRAVEO™ T2G Training](#)

# Revision History

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Revision	ECN	Submission Date	Description of Change
**	7781956	2022/07/05	Initial release
*A	7876252	2023/02/20	Updated the title Updated the figures in "Compiling and programming"

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