MCUXPresso IDE SWO Trace function

The MCUXpresso IDE SWO trace function is a special feature which enables user to observe variable update, interrupt entry/exit timing, interrupt event statistic, to print information in SWO ITM Console while the MCU is running. The MCUXpresso IDE SWO trace function is a supplement to the debugger of the MCUXpresso IDE. The main advantage is to display variable, print information, list interrupt entrying/exitting/returing while the MCU is running.

1. SWO function Hardware/software requirement and connection:

1). only support SWD port with SWO pin, generally all Cortex-M3 and M4 based MCUs for LPC family, do not support JTAG interface.

2) support LinkServer LPC-Link2, SEGGER J-Link, P&E Micro

3) The hardware circuit for the SWO feature:

In order to support the SWO trace function, the 10 pins SWD connector on target PCB board must include the following SWD signals: SWDIO, SWCLK, Reset and SWO pins.
If SWO function is NOT required, user can connect just three signals: SWDIO, SWCLK, Reset, SWO signal is NOT required.

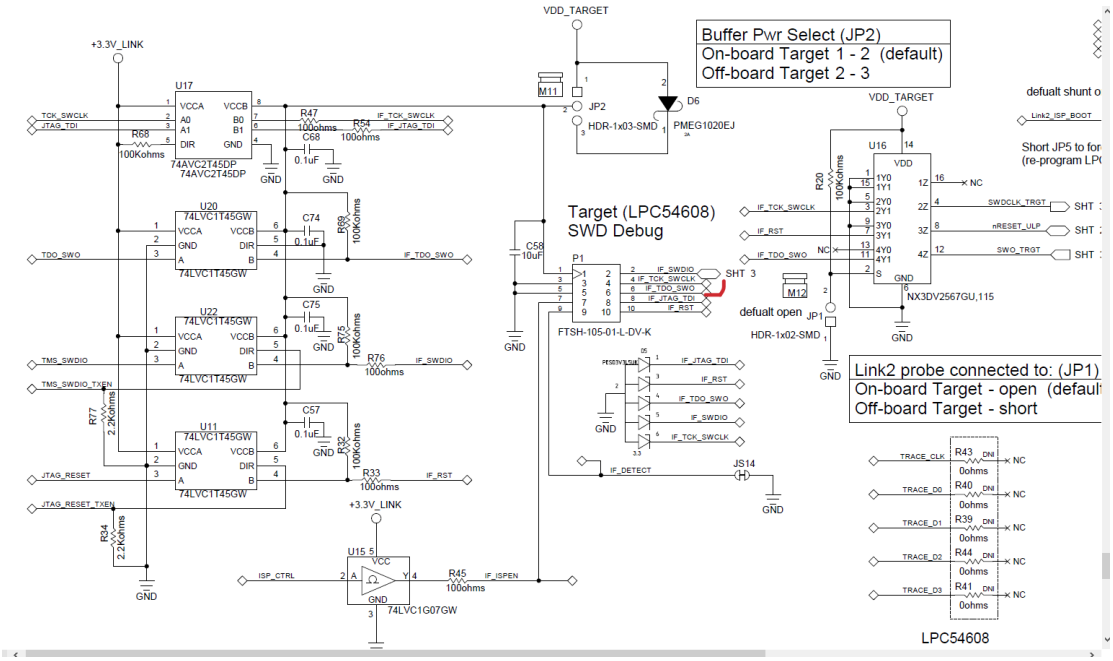


Figure 1 Part of SWD connector circuit for LPC54618

The above figure is part of the SWD circuit, from the circuit, the pin6 of SWD connector P1 is connected to SWO pin of LPC54618.

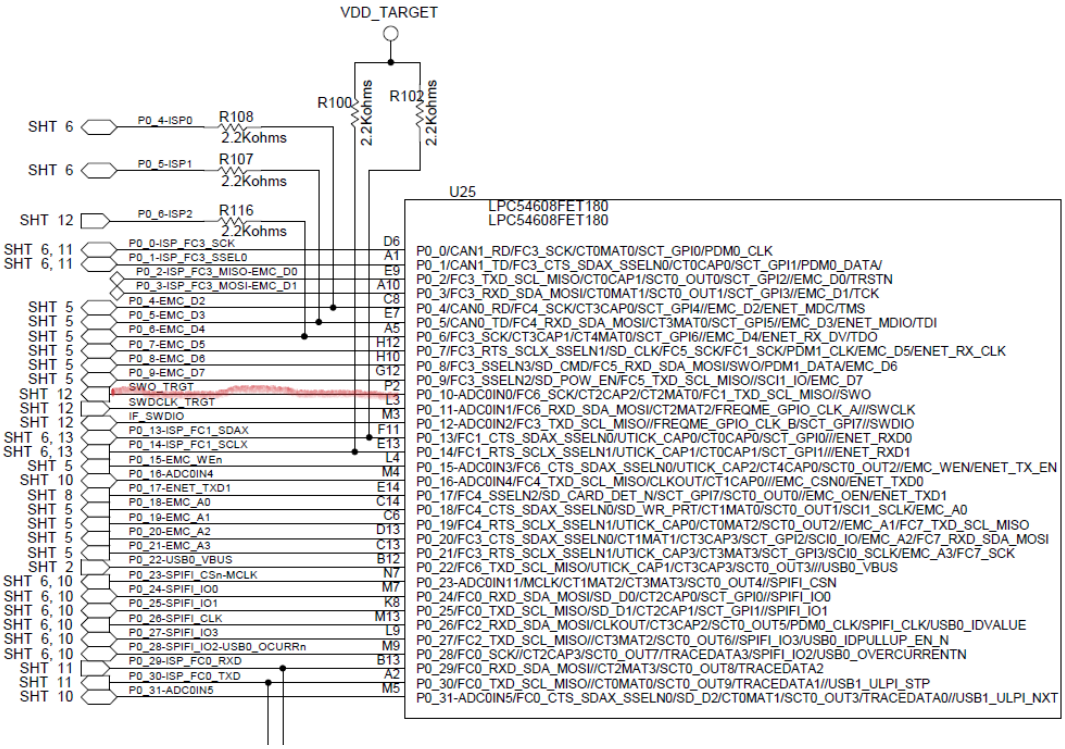


Figure 2 SWO pin assignment.

From the Figure 2, the SWO pin is multiplexed with PIO0_10, ADC0_0, FC6_SCK ,CTIMER2_CAP2, CTIMER2_MAT0, FC1_TXD_SCL_MISO , and SWO, the default configuration is GPIO function in input mode, so users have to use the following code to configure the PIO0_10 pin as SWO. The SWO pin is an OUTPUT ONLY signal.

BTW, you have to set up the traceclk, which is from the main-clk via a divider, so you have to set up the divider by setting the **ARMTRACECLKDIV** register.

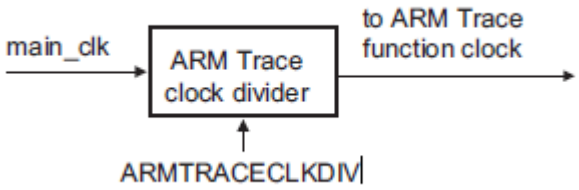


Figure 3 Trace clock diagram

Source Code configuration for LPC54618 for SWO pin assignment and trace clock configuration.

Note the SWO pin assignment is chip by chip, so pls check the SWD connector pin assignment and LPC chip pin assignment.

SWO pin assignment and trace clock configuration for LPC54618 only

```
void SWOConfig(void)
{
    volatile unsigned int *TRACECLKDIV = (unsigned int *) 0x40000304;
```

```
    volatile unsigned int *SYSAHBCLKCTRLSET = (unsigned int *) 0x40000220;
    //enable CONIO clock
    CLOCK_EnableClock(kCLOCK_Iocon);
    //configure the SWO pin
    IOCON_PinMuxSet(IOCON, 0, 10, IOCON_MODE_INACT | IOCON_FUNC6
|IOCON_DIGITAL_EN | IOCON_INPFILT_OFF);
    //enable the trace clock

    // Write 0x00000000 to TRACECLKDIV / Trace divider
    *TRACECLKDIV = 0;
    // Enable IOCON peripheral clock
    // by setting bit13 via SYSAHBCLKCTRLSET[0]
    *SYSAHBCLKCTRLSET = 1 << 13; // 0x2000
}
```

2. MCUXpresso Tools function.

SWO Profile

• Provides a statistical profile of application activity

SWO ITM Console

• A debug console for reading and writing text to and from your application

SWO Int Stats

• Provides counts and timing information for interrupts and interrupt handlers

SWO Int Trace

• Plots a time-line trace of interrupts

SWO Int Table

• Lists the raw entry, exit, and return SWO events for interrupt handlers

SWO Data

• Provides the ability to monitor (and update) up to four memory locations in real time, without stopping the CPU

SWO Counters

• Displays the target's performance counters

SWO Stats

• Displays Trace channel bandwidth usage and low-level debug information related to the SWO

For detailed introduction of the above SWO function pls refer to the documentation MCUXpresso_IDE_SWO_Trace.pdf located at:

……\MCUXpressoIDE_10.3.1_2233\

3. SWO function configuration in MCUXpresso IDE

1) Selecting the SWO function
   Click Window->Show View->Other, the Show View menu will appear as the following figure.

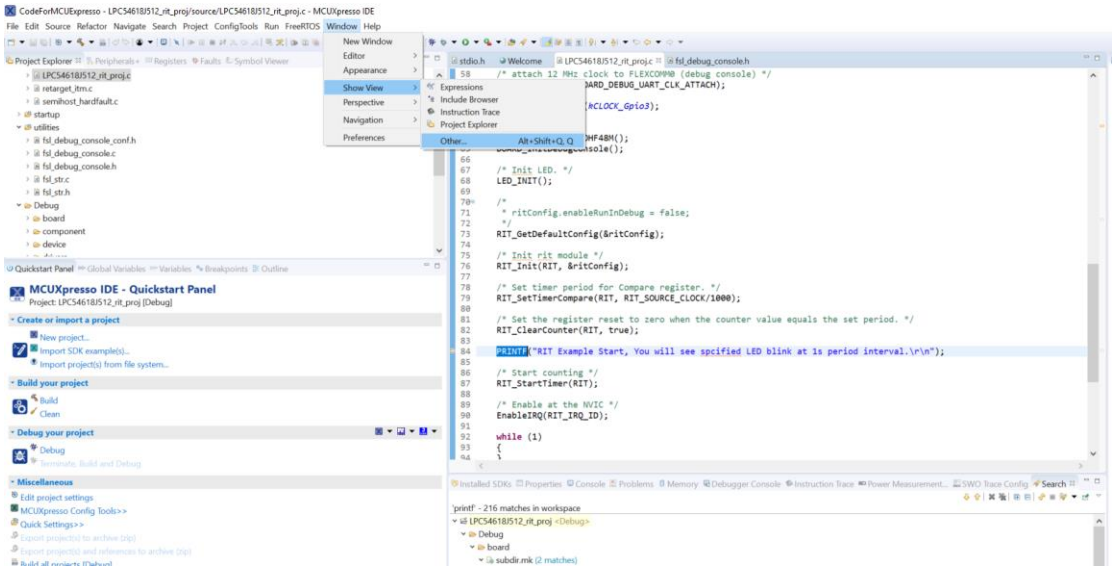


Figure 4 selecting the SWO function

As above figure, after you click Window->Show View->Other, the ShowView menu will appear, in the Text Box, input SWO characters, the MCUXpresso IDE Trace will appear as the following figure. For example, if you click SWO ITM Console, the SWO ITM Console will appear.

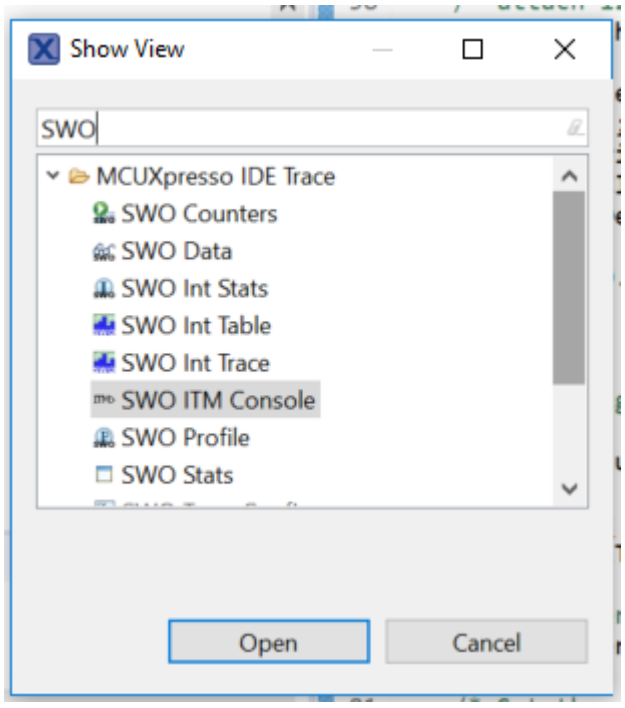
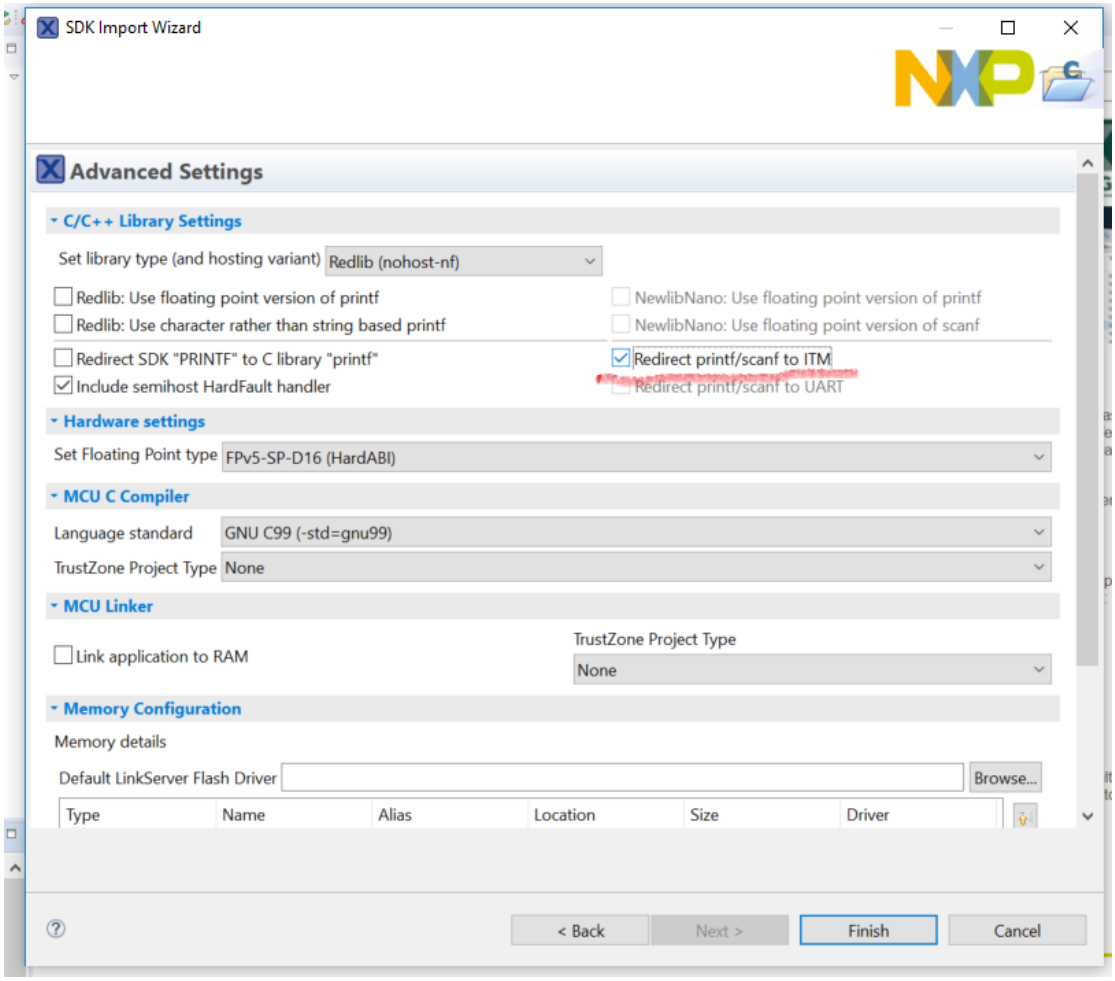


Figure 5 SWO function selection

4. The SWO ITM Console function

The SWO ITM Console function is a window, the source code can use Printf() to print character or variable to the window.

The SWO ITM Console function is special, you have to choose the SWO ITM function when you create a new project, in this way, the print() function will print on the SWO ITM Console



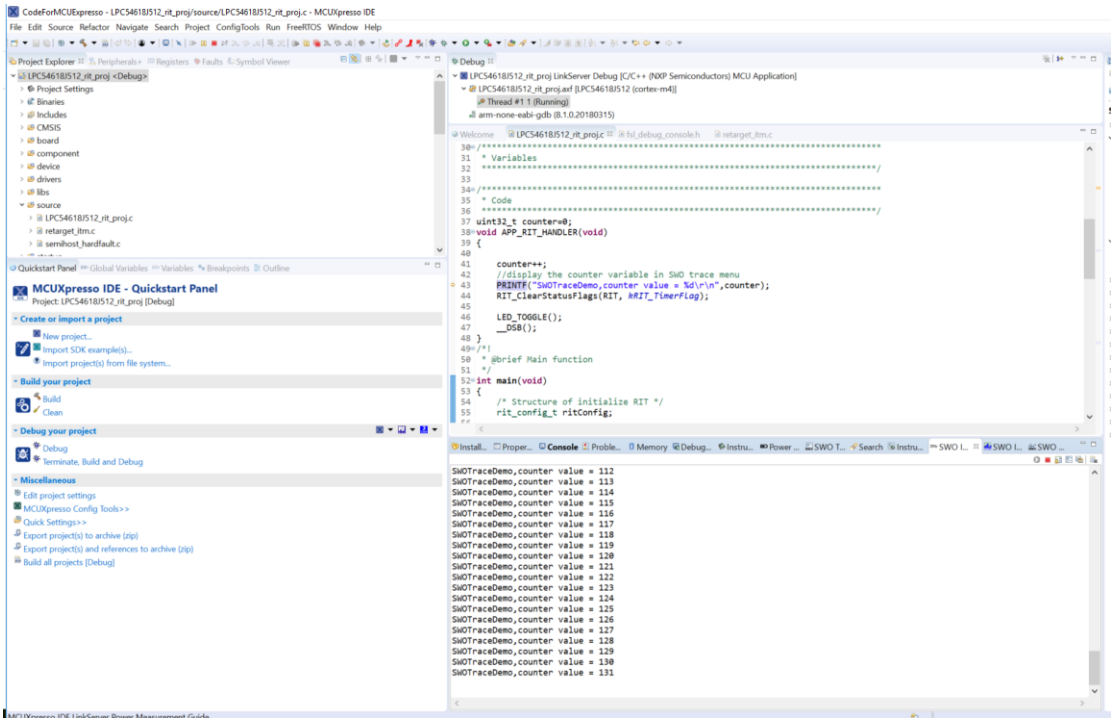
The following code is an interrupt service routine for LPC546xx Repetitive Interrupt Timer module, in other words, `APP_RIT_HANDLER() is executed at a fixed cycle time which is programmable.`

```
void APP_RIT_HANDLER(void)
{

    counter++;
    //display the counter variable in SWO trace menu
    PRINTF("SWOTraceDemo,counter value = %d\r\n",counter);
    RIT_ClearStatusFlags(RIT, kRIT_TimerFlag);

    LED_TOGGLE();
    __DSB();
}
```

The PRINT() function prints the count variable on the SWO ITM Console.



In conclusion, the document describes the SWO function hardware connection and MCUXpresso IDE configuration, give the code to set the SWO pin and trace clock.