

## Introduction

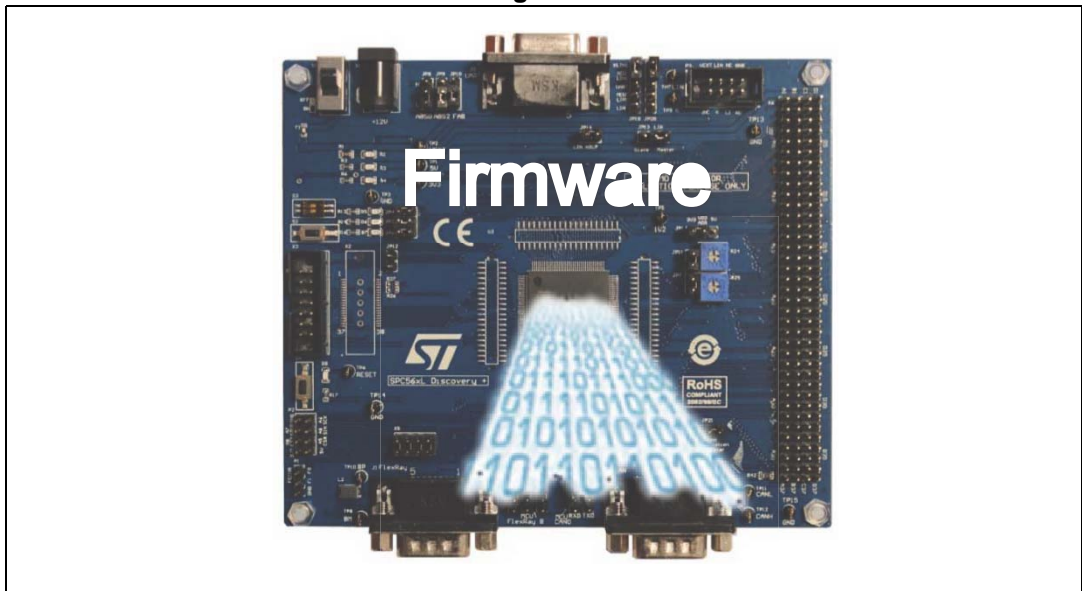
This software package includes several firmware examples for SPC56L-Discovery Kit. These ready-to-run examples are provided to help the user to get started quickly with SPC56 L (leopard) line microcontrollers and SCP5L-Discovery hardware. Every example includes source files, the related binary and elf files to program, modify and debug with any environment/tool. It includes as well SPC5Studio project files to easily import, open and modify them using SPC5Studio configurator wizards.

All software examples are mapped on SPC56EL70L5 and SPC56L-Discovery pin configuration but with SPC5Studio they can be easily adapted to any MCU of the same product line and to any target board making discovery kit an ideal evaluation and pre-development platform.

Users are advised to first read the document *AN4321 "Getting started with the SPC56L-Discovery"* and *UM1650 "SPC56L-Discovery user manual"* (see [Section Appendix A: Document references](#)) to familiarize themselves with SPC56L-Discovery.

These examples are included in the firmware applications package available for download on ST WEB (product code: STSW-SPC56001FW).

Figure 1.



# Contents

- 1      GPIO Toggle OS-Less (pre-loaded in Discovery MCU Flash)      3**
  - 1.1 Purpose ..... 3
  - 1.2 Description ..... 3
  - 1.3 Usage ..... 3
  
- 2      PWM-ICU OS-Less ..... 4**
  - 2.1 Purpose ..... 4
  - 2.2 Description ..... 4
  - 2.3 Usage ..... 4
  
- 3      DSPI OS-Less ..... 5**
  - 3.1 Purpose ..... 5
  - 3.2 Description ..... 5
  - 3.3 Usage ..... 5
  
- 4      GPIO Toggle with ChibiOS-RT ..... 6**
  - 4.1 Purpose ..... 6
  - 4.2 Description ..... 6
  - 4.3 Usage ..... 6
  
- Appendix A Document references ..... 7**
  
- Revision history ..... 8**



# 1 GPIO Toggle OS-Less (pre-loaded in Discovery MCU Flash)

## 1.1 Purpose

This example shows how to use the GPIO port bit set/reset for I/O LED toggling.

## 1.2 Description

- In this example:
- SD1 is set to 38400-8-N-1
- “Hello World!\r\n” is output to SD1 serial interface.
- GPIO port A pins 0 and 1 are configured and associated to PA\_LED5 and PA\_LED6 on the board.
- GPIO port G pins 4 is configured and associated to PG\_LED7 on the board.
- In an infinite `while` loop, the PA\_LED, PA\_LED6 and PG\_LED7 are set and reset to create a visible sequence to test the board.
- A delay is inserted between setting and resetting leds on the board to make the sequence as slow as needed

## 1.3 Usage

- All the source code related to SPC5Studio components is located in `./components/<component_name>/[cfg/lib]/[include/src]` within the project folder
- To run and debug application you can either:
- Double click on `./UDE/debug.wsx` (using PLS debugger)
- Download `./build/out.elf` with your favorite debugger
- Makefile and `application.ld` files are in the root folder of the project

## 2 PWM-ICU OS-Less

### 2.1 Purpose

This example shows how to use the SPC5 Studio HAL's PWM and ICU drivers.

### 2.2 Description

In this example:

- Initializes the PWM driver 1 and ICU driver 1
  - GPIO port D pin 10 is the PWM output
  - GPIO port A pin 0 is the ICU input
- The two pins have to be externally connected together
- Starts the PWM channel 0 using 75% duty cycle.
- Changes the PWM channel 0 to 50% duty cycle.
- Changes the PWM channel 0 to 25% duty cycle.
- Changes PWM period and the PWM channel 0 to 50% duty cycle
- Disables channel 0 and stops the driver

### 2.3 Usage

- All the source code related to SPC5Studio components is located in `./components/<component_name>/[cfg/lib]/[include/src]` within the project folder
- To run and debug application you can either:
  - Double click on `./UDE/debug.wsx` (using PLS debugger)
  - Download `./build/out.elf` with your favorite debugger
- Makefile and application.ld files are in the root folder of the project

## 3 DSPI OS-Less

### 3.1 Purpose

- This example shows how to use the SPC5 Studio HAL's DSPI driver.

### 3.2 Description

In this example:

- Prepare transmit pattern
- Starting driver for test, DSPI\_0 I/O pins setup
- Testing sending and receiving at the same time.
- Testing clock pulses without data buffering.
- Testing sending data ignoring incoming data.
- Testing receiving data while sending idle bits (high level).
- Testing stop procedure.
- Application main loop, two SPI configuration are used alternating them.
- PA\_LED5 is used to understand when high and low speed configurations are switching.

### 3.3 Usage

- All the source code related to SPC5Studio components is located in `./components/<component_name>/[cfg/lib]/[include/src]` within the project folder
- To run and debug application you can either:
  - Double click on `./UDE/debug.wsx` (using PLS debugger)
  - Download `./build/out.elf` with your favorite debugger
- Makefile and `application.ld` files are in the root folder of the project

## 4 GPIO Toggle with ChibiOS-RT

### 4.1 Purpose

- This example shows how to use the ChibiOS-RT free operating system.

### 4.2 Description

In this example:

- SD1 is set to 38400-8-N-1.
- Activates the serial driver 1 using the driver default configuration.
- Creates the blinker thread.
- A static WORKING\_AREA is reserved for the blinker thread.
- In the Thread1 function, named “blinker”, an infinite `while` loop is present, where the PA\_LED, PA\_LED6 and PG\_LED7 are set and reset to create a visible sequence to test the board.
- You can connect a serial terminal to SD1 and communicate with ChibiOS kernel.

### 4.3 Usage

- All the source code related to SPC5Studio components is located in `./components/<component_name>/[cfg/lib]/[include/src]` within the project folder
- To run and debug application you can either:
  - Double click on `./UDE/debug.wsx` (using PLS debugger)
  - Download `./build/out.elf` with your favorite debugger
- Makefile and `application.ld` files are in the root folder of the project
- Development toolchain
- SPC5Studio (includes Hightec GNU “C” compiler, with a 30-days full free trial license)
- PC5-UDESTK

## Appendix A Document references

- *Getting started with the SPC56L-Discovery* (AN4321, Doc ID 024948)
- *SPC56L-Discovery* (UM1650, Doc ID 024947).

## Revision history

**Table 1. Document revision history**

Date	Revision	Changes
20-Dec-2013	1	Initial release.



**Please Read Carefully:**

Information in this document is provided solely in connection with ST products. STMicroelectronics NV and its subsidiaries ("ST") reserve the right to make changes, corrections, modifications or improvements, to this document, and the products and services described herein at any time, without notice.

All ST products are sold pursuant to ST's terms and conditions of sale.

Purchasers are solely responsible for the choice, selection and use of the ST products and services described herein, and ST assumes no liability whatsoever relating to the choice, selection or use of the ST products and services described herein.

No license, express or implied, by estoppel or otherwise, to any intellectual property rights is granted under this document. If any part of this document refers to any third party products or services it shall not be deemed a license grant by ST for the use of such third party products or services, or any intellectual property contained therein or considered as a warranty covering the use in any manner whatsoever of such third party products or services or any intellectual property contained therein.

**UNLESS OTHERWISE SET FORTH IN ST'S TERMS AND CONDITIONS OF SALE ST DISCLAIMS ANY EXPRESS OR IMPLIED WARRANTY WITH RESPECT TO THE USE AND/OR SALE OF ST PRODUCTS INCLUDING WITHOUT LIMITATION IMPLIED WARRANTIES OF MERCHANTABILITY, FITNESS FOR A PARTICULAR PURPOSE (AND THEIR EQUIVALENTS UNDER THE LAWS OF ANY JURISDICTION), OR INFRINGEMENT OF ANY PATENT, COPYRIGHT OR OTHER INTELLECTUAL PROPERTY RIGHT.**

**ST PRODUCTS ARE NOT DESIGNED OR AUTHORIZED FOR USE IN: (A) SAFETY CRITICAL APPLICATIONS SUCH AS LIFE SUPPORTING, ACTIVE IMPLANTED DEVICES OR SYSTEMS WITH PRODUCT FUNCTIONAL SAFETY REQUIREMENTS; (B) AERONAUTIC APPLICATIONS; (C) AUTOMOTIVE APPLICATIONS OR ENVIRONMENTS, AND/OR (D) AEROSPACE APPLICATIONS OR ENVIRONMENTS. WHERE ST PRODUCTS ARE NOT DESIGNED FOR SUCH USE, THE PURCHASER SHALL USE PRODUCTS AT PURCHASER'S SOLE RISK, EVEN IF ST HAS BEEN INFORMED IN WRITING OF SUCH USAGE, UNLESS A PRODUCT IS EXPRESSLY DESIGNATED BY ST AS BEING INTENDED FOR "AUTOMOTIVE, AUTOMOTIVE SAFETY OR MEDICAL" INDUSTRY DOMAINS ACCORDING TO ST PRODUCT DESIGN SPECIFICATIONS. PRODUCTS FORMALLY ESCC, QML OR JAN QUALIFIED ARE DEEMED SUITABLE FOR USE IN AEROSPACE BY THE CORRESPONDING GOVERNMENTAL AGENCY.**

Resale of ST products with provisions different from the statements and/or technical features set forth in this document shall immediately void any warranty granted by ST for the ST product or service described herein and shall not create or extend in any manner whatsoever, any liability of ST.

ST and the ST logo are trademarks or registered trademarks of ST in various countries.

Information in this document supersedes and replaces all information previously supplied.

The ST logo is a registered trademark of STMicroelectronics. All other names are the property of their respective owners.

© 2013 STMicroelectronics - All rights reserved

STMicroelectronics group of companies

Australia - Belgium - Brazil - Canada - China - Czech Republic - Finland - France - Germany - Hong Kong - India - Israel - Italy - Japan - Malaysia - Malta - Morocco - Philippines - Singapore - Spain - Sweden - Switzerland - United Kingdom - United States of America

[www.st.com](http://www.st.com)

