

## Introduction

This app note will explain how to use Silego's Arduino Library to interact with GreenPAK devices using I2C communication. An Arduino Library allows a user to create a simpler program by offloading common functions and declarations into a separate library folder. In this case, we have created a library and a set of macros for each I2C-compatible GreenPAK device. That library is available on this App Note's website page. For more information about using I2C with GreenPAK, read [AN-1090](#). This app note will assume the user has basic knowledge of the Arduino IDE, but is unfamiliar with Arduino Libraries.

## Installing the Library

The first thing you need to do is download the "SilegoLibrary.zip" folder. Unzip this folder into your Arduino libraries directory. The default location for this directory is:

C:\Program Files (x86)\Arduino\libraries

Inside the "SilegoLibrary" folder you will find five items:

- Silego.h – header file that includes definitions for the library
- Silego.cpp – C++ file that includes the library code
- library.properties – includes meta information for the Arduino libraries manager
- macros directory – holds several header files which define shortcut macros to simplify code
- examples directory – includes a few example programs to help you get the hang of using the library

Once your library is in the correct directory, you will need to include it by opening up an Arduino sketch, then navigating to Sketch -> Include Library -> Manage Libraries. You should see a progress bar appear briefly at the bottom of the "Library Manager" window. Once the progress bar disappears, you can use the search field to verify that "Silego" appears among your libraries.

## Using the Library

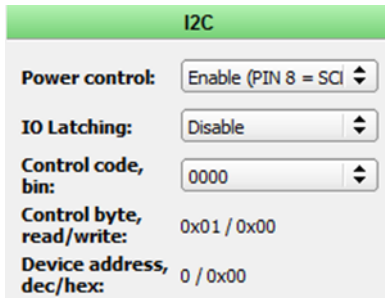
Within your Arduino sketch you need to include your header files and create an instance of the Silego class. In this case, we'll call the class "silego" with a lowercase "s".

```
// Include Silego header file
#include "Silego.h"

// Include macros for SLG46531
#include "macros/SLG46531.h"

// Create an instance of Silego
class called "silego" with device
address 0x00
Silego silego(0x00);
```

When you create the instance of the Silego class, you will need to pass it a byte-long parameter, which will give your class the device address you're working with. The device address in Dialog's SLG46531V chip can be configured by editing its control code within the I2C properties sidebar as shown in Figure 1.



**Figure 1. I2C Properties**

The SLG46531V has 16 possible device addresses, shown in Table 1. For this example we will use address 0x00.

| Control Code, bin: | Device address, dec: | Device address, hex: |
|--------------------|----------------------|----------------------|
| 0000               | 0                    | 0x00                 |
| 0001               | 8                    | 0x08                 |
| 0010               | 16                   | 0x10                 |
| 0011               | 24                   | 0x18                 |
| 0100               | 32                   | 0x20                 |
| 0101               | 40                   | 0x28                 |
| 0110               | 48                   | 0x30                 |
| 0111               | 56                   | 0x38                 |
| 1000               | 64                   | 0x40                 |
| 1001               | 72                   | 0x48                 |
| 1010               | 80                   | 0x50                 |
| 1011               | 88                   | 0x58                 |
| 1100               | 96                   | 0x60                 |
| 1101               | 104                  | 0x68                 |
| 1110               | 112                  | 0x70                 |
| 1111               | 120                  | 0x78                 |

**Table 1. GreenPAK SLG46531V Device addresses**

## WriteI2C

There are two functions available in version 0.0.1 of the Silego library: writeI2C and readI2C. The syntax to call one of these functions in an Arduino sketch is `silego.function(parameters);`. WriteI2C is defined in Silego.h with three variants:

```
void writeI2C(byte byte_address,
byte data);
void writeI2C(byte byte_address,
bool data, byte bit_location);
void writeI2C(byte byte_address,
byte data, byte bit_location, byte
length);
```

The first variant allows the user to write a byte of data to the register address given in the first parameter. The second variant allows the user to write a single bit of data to the byte address in the first parameter and the bit location given as the third parameter without altering the rest of the bits in the byte. For instance, if you wanted to write "xxx1 xxxx" to byte\_address 0xCC (where "x's" are bits you don't wish to change), your command would be:

```
writeI2C(0xCC, 1, 0x10);
```

Where:

- 0xCC = the register's byte\_address
- 1 = the Boolean value you wish to write
- 0x10 = the bit\_location offset, since the desired bit in "xxx1 xxxx" occurs at the 2<sup>4</sup> bit location

The last writeI2C command allows you to write several consecutive bits to a register by adding in a "length" parameter.

If you wanted to use this function to write "x100 1xxx" to byte address 0xCC, the command would be:

```
writeI2C(0xCC, 1001, 0x08, 0x04);
```

Where:

- 0xCC = the register's `byte_address`
- 1001 = the value you wish to write
- 0x08 = the `bit_location` offset of the written value's LSB, which occurs at "xxxx 1xxx", the  $2^3$  bit location
- 0x04 = the length of the value you wish to write (1001 is 4 bits long)

### ReadI2C

Like `writeI2C`, the `readI2C` function has multiple variants that can be called depending on how many parameters are included by the user:

```
uint8_t readI2C(byte byte_address);
bool readI2C(byte byte_address, byte bit_location);
```

The first variant only includes one parameter, the byte address you wish to read. This variant will return the value of the byte stored in the GreenPAK's register at the specified byte address. If you wish to read the value stored at address 0xCC, you would need a command that looks something like this:

```
uint8_t myVariable = readI2C(0xCC);
```

The second variant of `readI2C` returns a Boolean which represents the value of a single bit within a byte located at `byte_address`.

If the value stored at 0xCC is "1111 1011", then the following command would return 0 because the bit value at the  $2^2$  bit location is 0:

```
readI2C(0xCC, 0x02);
```

### Macros

Back in Section 3 we had you include a file called "SLG46531.h" at the top of your Arduino sketch. If you open up that file you'll see that there are about 100 pre-defined macros to simplify your I2C commands. Each macro's value is taken from the product's datasheet which can be downloaded from the Dialog's website.

### Example Arduino Sketch

In the code below, we have our included files at the top, followed by our instantiation of the Silego library with the device address 0x00. We then declare byte "a" and call `Serial.begin(9600)` to start serial data transmission at 9600 baud. Byte "a" is written to byte\_address `RAM_BYTE_0` using `writeI2C`. Then we read back the value of "a" and store it in "myData." Finally, we print out "myData" to the Arduino Serial Monitor and increment "a."

```

#include "Silego.h" //
Include Silego header file
#include "macros/SLG46531.h" //
Include macros for SLG46531

// Create an instance of Silego
class called
// "silego" with device address 0x00
Silego silego(0x00);

byte a = 0;

void setup() {
  Serial.begin(9600);
  Serial.print("GreenPAK: ");
  Serial.println(GreenPAK);
}

void loop() {
  // write the value of variable "a"
  to byte_address RAM_BYTE_0
  silego.writeI2C(RAM_BYTE_0, a);

  // read the data in RAM_BYTE_0 and
  store it in variable "myData"
  byte myData =
  silego.readI2C(RAM_BYTE_0);

  Serial.print("myData: "); //
  print the value of "myData" to
  Serial.print(myData); //
  the Arduino Serial Monitor
  Serial.println();
  a++;
  delay(100);
}

```

### Conclusion

In this App Note we explained how to use Silego's Arduino Library to simplify testing and prototyping with I2C-capable GreenPAK devices. Using I2C with GreenPAK allows the user to see what's going on inside the GreenPAK in real time, and also allows them to change settings and connections on the fly. This capability makes Dialog's GreenPAK products extremely flexible IC's that can be used in a variety of applications.

## IMPORTANT NOTICE AND DISCLAIMER

RENESAS ELECTRONICS CORPORATION AND ITS SUBSIDIARIES (“RENESAS”) PROVIDES TECHNICAL SPECIFICATIONS AND RELIABILITY DATA (INCLUDING DATASHEETS), DESIGN RESOURCES (INCLUDING REFERENCE DESIGNS), APPLICATION OR OTHER DESIGN ADVICE, WEB TOOLS, SAFETY INFORMATION, AND OTHER RESOURCES “AS IS” AND WITH ALL FAULTS, AND DISCLAIMS ALL WARRANTIES, EXPRESS OR IMPLIED, INCLUDING, WITHOUT LIMITATION, ANY IMPLIED WARRANTIES OF MERCHANTABILITY, FITNESS FOR A PARTICULAR PURPOSE, OR NON-INFRINGEMENT OF THIRD-PARTY INTELLECTUAL PROPERTY RIGHTS.

These resources are intended for developers who are designing with Renesas products. You are solely responsible for (1) selecting the appropriate products for your application, (2) designing, validating, and testing your application, and (3) ensuring your application meets applicable standards, and any other safety, security, or other requirements. These resources are subject to change without notice. Renesas grants you permission to use these resources only to develop an application that uses Renesas products. Other reproduction or use of these resources is strictly prohibited. No license is granted to any other Renesas intellectual property or to any third-party intellectual property. Renesas disclaims responsibility for, and you will fully indemnify Renesas and its representatives against, any claims, damages, costs, losses, or liabilities arising from your use of these resources. Renesas' products are provided only subject to Renesas' Terms and Conditions of Sale or other applicable terms agreed to in writing. No use of any Renesas resources expands or otherwise alters any applicable warranties or warranty disclaimers for these products.

(Disclaimer Rev.1.01 Jan 2024)

### Corporate Headquarters

TOYOSU FORESIA, 3-2-24 Toyosu,  
Koto-ku, Tokyo 135-0061, Japan  
[www.renesas.com](http://www.renesas.com)

### Trademarks

Renesas and the Renesas logo are trademarks of Renesas Electronics Corporation. All trademarks and registered trademarks are the property of their respective owners.

### Contact Information

For further information on a product, technology, the most up-to-date version of a document, or your nearest sales office, please visit [www.renesas.com/contact-us/](http://www.renesas.com/contact-us/).