# CN051-3 Smart Rangefinder Solution

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Rev.1.00
July, 2021

## Introduction

This guide describes the set up process of smart rangefinder with mobile App. It can measure the distance of object.

## Target Device

DA14531 SmartBond TINY module

ISL29501

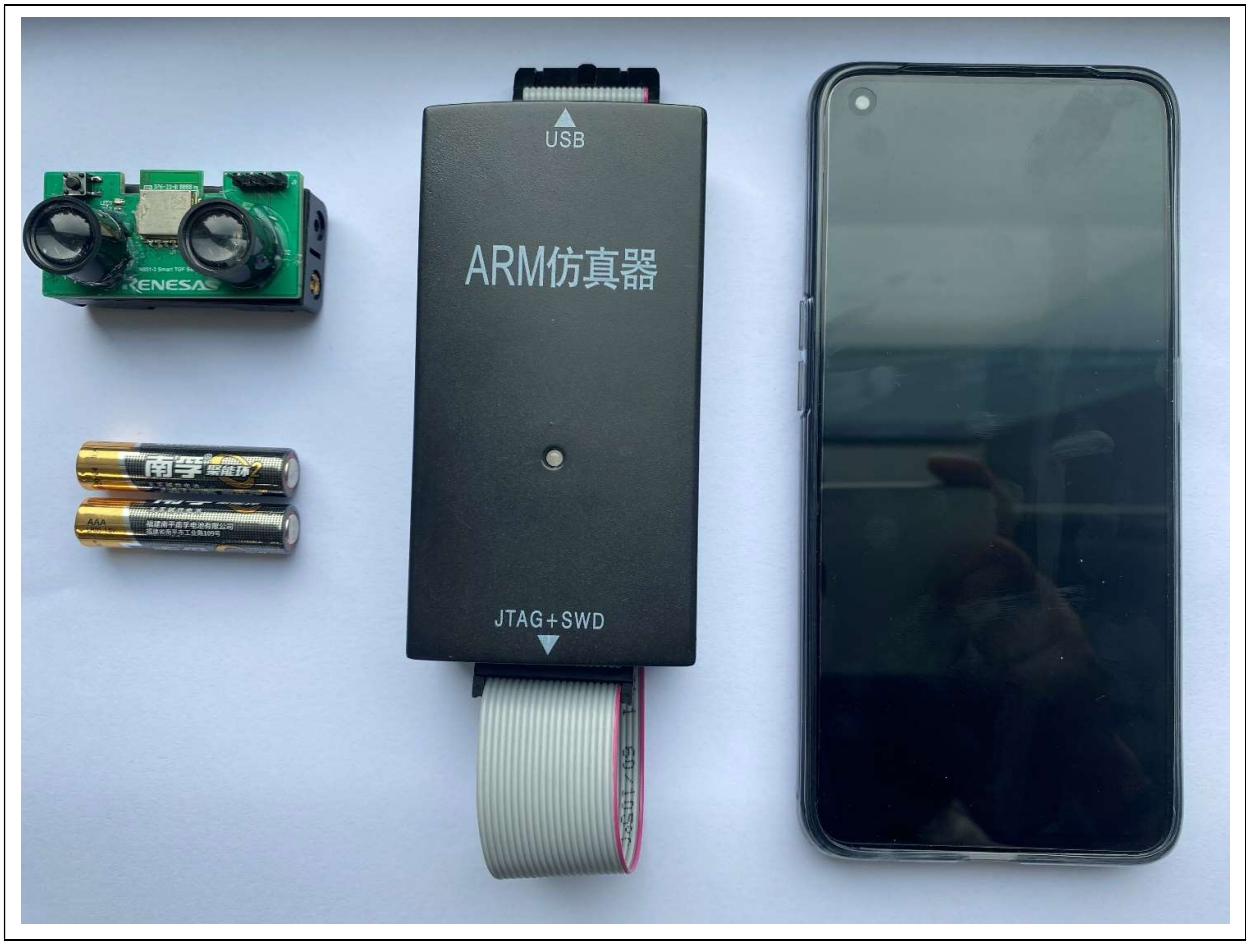
## Contents

# 1. Kit Contents

To set up this demo, the following components are needed:

## 1.1 Hardware Components

- CN051-3 Smart rangefinder board
- Micro USB cable
- JLINK debugger / programmer




## 1.2 Software Components

Below software components are need:

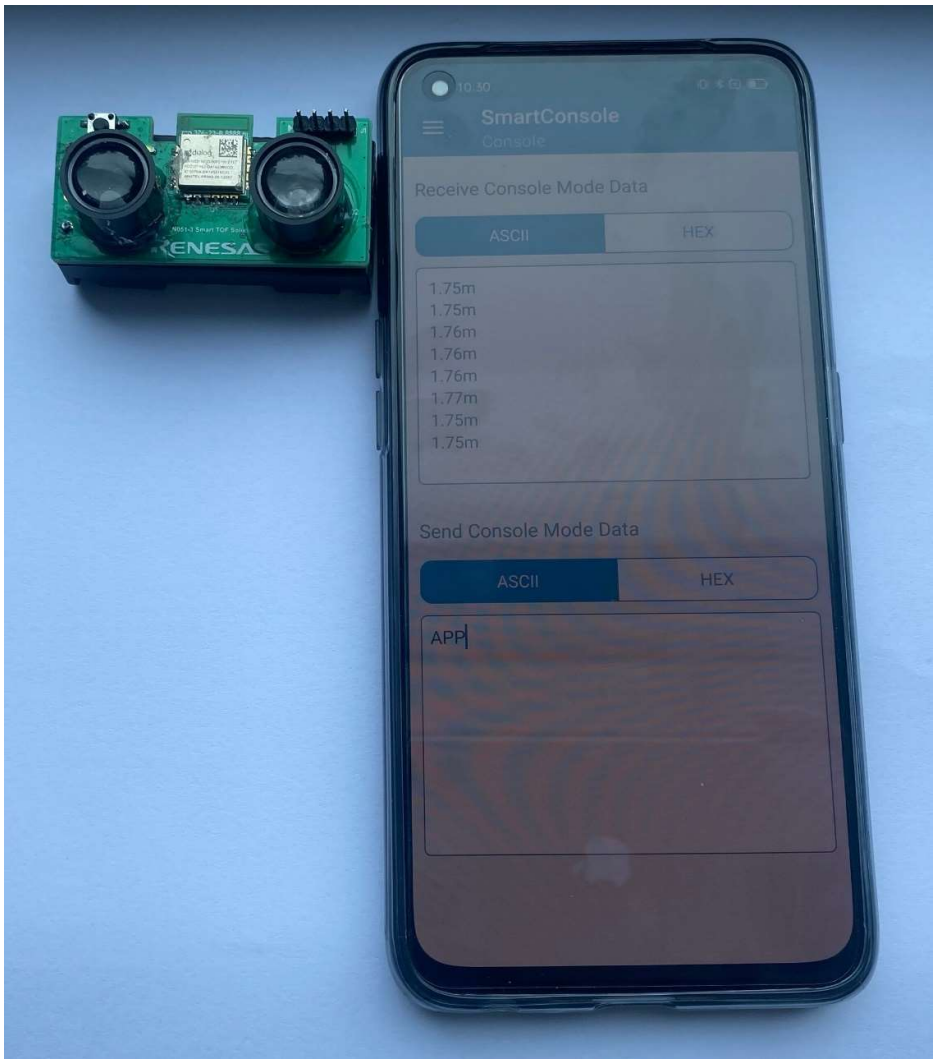
| Category | Item | Remark |
|---|---|---|
| Firmware | CN051-3 Smart Rangefinder with Mobile App.bin | DA14531 module firmware |
| Software | Dialog SmartBond Flash Programmer v1.0.6 | Install it to your PC, and use it to program bin file to DA14531MOD SPI flash |
| Mobile App | Dialog Smart Console for iOS | Use it to view the measurement result |
| | Dialog Smart Console for Android | |

## 2. Features

- Measure distance from smart rangefinder and object with accuracy about 5%
- BLE connectivity to the mobile App (SmartConsole App) with DA14531MOD
- SmartConsole App can calibrate smart rangefinder and display the distance

## 3. Image

This demo can measure distance and transmit these results to mobile phone via Dialog DA14531 BLE module. “SmartConsole” App designed by Dialog can be used both with Android and iOS



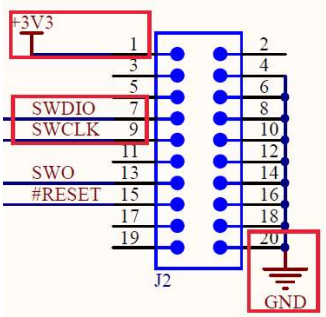

**SmartConsole on Android and iOS**

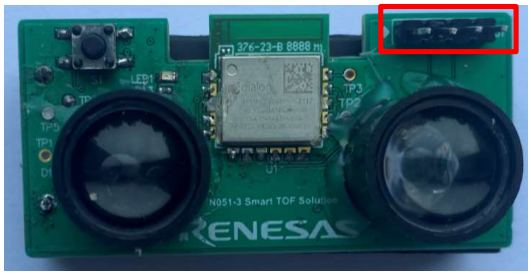
# 4. Set Up the Demo

## 4.1 Programming Code to BLE TINY Module

Step 1. Firstly, the SWD programming pins of BLE TINY click board should be soldered.

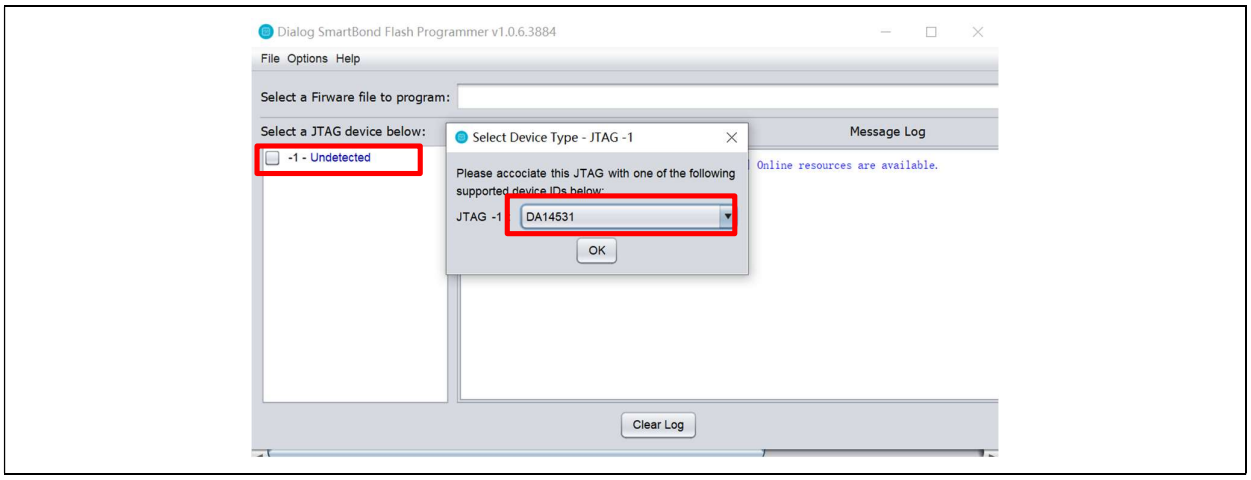
Then, connect the SWD programming pins of J-Link debugger and BLE TINY click board as below figure.



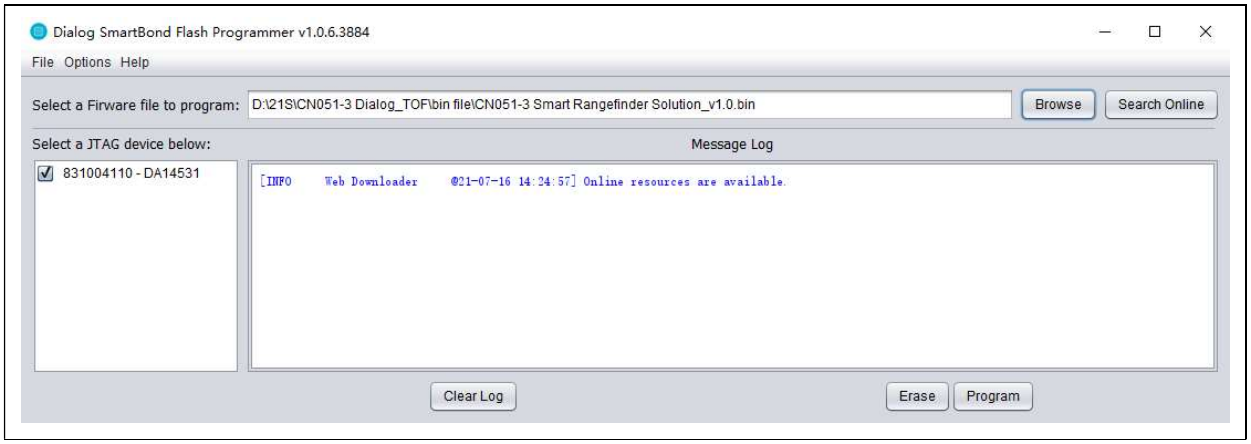




Step 2. Open Dialog SmartBond Flash Programmer, if JTAG device is undetected automatically, click it and select DA14531.

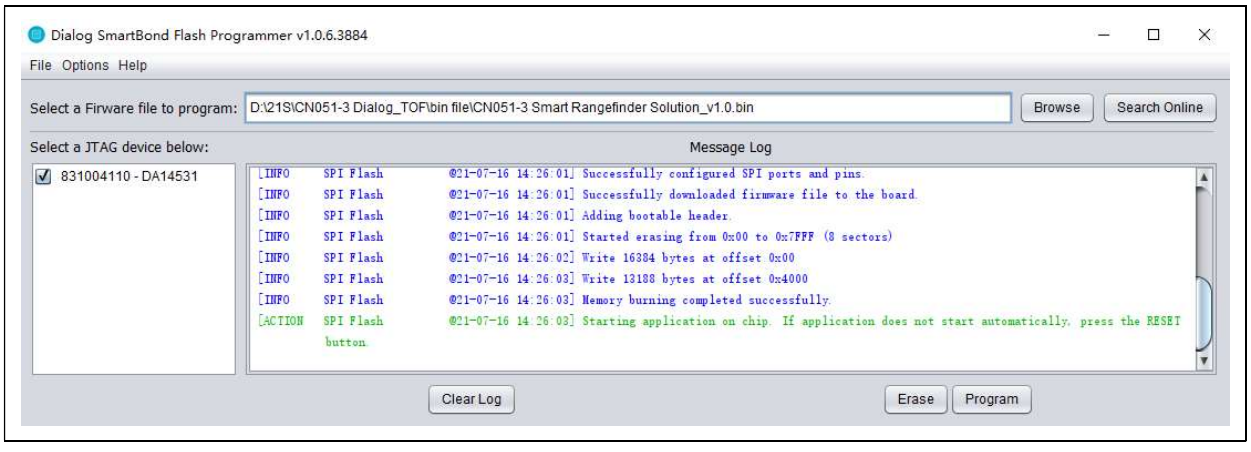
(Note: Dialog SmartBond Flash Programmer download link: Development Tool of https://www.dialog-semiconductor.com/products/bluetooth-low-energy/da14530-and-da14531#tab-field_tab_content_resources)




Step 3. Check the selected JTAG device, and then select the “CN051-3 Smart Rangefinder Solution_v1.0.bin” file by Browse.




Step 4. After programming, disconnect the board from the PC.



Install iOS / Android App

Dialog SmartConsole App is needed for this demo. The iOS version can be downloaded from the Apple iTunes Store, and the Android version from Google Play.


### 4.1.1 Running the Demo Application Operation

Step 1. Open the SmartConsole App on your iOS mobile phone or your Android mobile phone and connect the device.

Step 2. Type “APP” in “Send Console Mode Data” window

Step 3. Watch the receive window of SmartConsole, distance data will show.

Note: Calibration has done for the smart rangefinder before release.

### 4.1.2 Calibration Operation

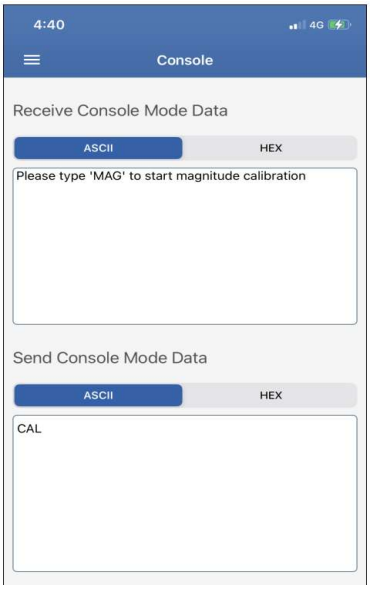
Step 1. Set “ASCII” option and type “CAL” in input window of SmartConsole App.

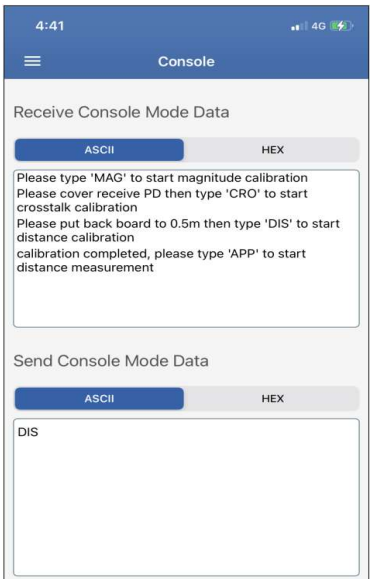
There is “Please type ‘MAG’ to start magnitude calibration” in receive window.

Step 2. Type “MAG” in send window of SmartConsole App, magnitude calibration will do and after completed “Please cover receive PD then type ‘CRO’ to start crosstalk calibration” will show to ask customer to mask PD named “D1” of board.

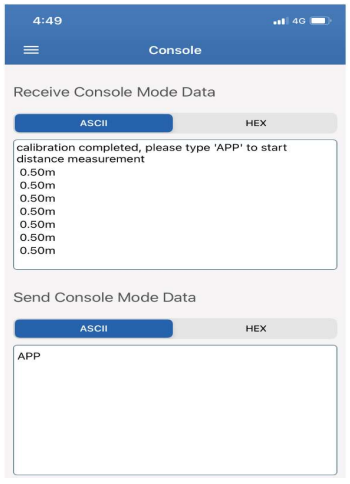
Step3. After masked receive PD which named “D1”, then type “CRO” in send window. Crosstalk calibration will do and after crosstalk calibration completed, “Please put back board to 0.5m then type ‘DIS’ to start distance calibration”

Step4. Put the back board to 0.5m from smart rangefinder, then type “DIS”, distance calibration will do.




Step5. After distance calibration completed, “calibration completed, please type ‘APP’ to start distance measurement” will show in receive window. After “APP” typed, measurement data display just as bellow.



## 4.2 Debug the Keil Project

If you need to debug the demo project, you can open the Keil5 project from the below path:

..\ CN051-3 Smart Rangefinder Solution_v1.0 \projects\target_apps\dsps\dsps_device\Keil_5\ dsps_device.uvprojx

## 5. Reference Documents

Dialog DA14531MOD

https://www.dialog-semiconductor.com/products/bluetooth-low-energy/bluetooth-module-da14531-smartbond-tiny

MIKROE BLE TINY CLICK with DA14531MOD

https://www.mikroe.com/ble-tiny-click

Renesas ISL29501

https://www.renesas.com/jp/zh/products/sensor-products/light-proximity-sensors/proximity-sensors/isl29501-time-flight-tof-signal-processing-ic

Technical Updates/Technical News

(The latest information can be downloaded from the Renesas Electronics Website.)

## Website and Support

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http://www.renesas.com/

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## Revision History

| | | Description | |
|---|---|---|---|
| **Rev.** | **Date** | **Page** | **Summary** |
| 1.00 | July. 31, 2021 | — | First edition issued |

# General Precautions in the Handling of Micro processing Unit and Microcontroller Unit Products

The following usage notes are applicable to all Micro processing unit and Microcontroller unit products from Renesas. For detailed usage notes on the products covered by this document, refer to the relevant sections of the document as well as any technical updates that have been issued for the products.

1. Precaution against Electrostatic Discharge (ESD)

   A strong electrical field, when exposed to a CMOS device, can cause destruction of the gate oxide and ultimately degrade the device operation. Steps must be taken to stop the generation of static electricity as much as possible, and quickly dissipate it when it occurs. Environmental control must be adequate. When it is dry, a humidifier should be used. This is recommended to avoid using insulators that can easily build up static electricity. Semiconductor devices must be stored and transported in an anti-static container, static shielding bag or conductive material. All test and measurement tools including work benches and floors must be grounded. The operator must also be grounded using a wrist strap. Semiconductor devices must not be touched with bare hands. Similar precautions must be taken for printed circuit boards with mounted semiconductor devices.

2. Processing at power-on

   The state of the product is undefined at the time when power is supplied. The states of internal circuits in the LSI are indeterminate and the states of register settings and pins are undefined at the time when power is supplied. In a finished product where the reset signal is applied to the external reset pin, the states of pins are not guaranteed from the time when power is supplied until the reset process is completed. In a similar way, the states of pins in a product that is reset by an on-chip power-on reset function are not guaranteed from the time when power is supplied until the power reaches the level at which resetting is specified.

3. Input of signal during power-off state

   Do not input signals or an I/O pull-up power supply while the device is powered off. The current injection that results from input of such a signal or I/O pull-up power supply may cause malfunction and the abnormal current that passes in the device at this time may cause degradation of internal elements. Follow the guideline for input signal during power-off state as described in your product documentation.

4. Handling of unused pins

   Handle unused pins in accordance with the directions given under handling of unused pins in the manual. The input pins of CMOS products are generally in the high-impedance state. In operation with an unused pin in the open-circuit state, extra electromagnetic noise is induced near the LSI, an associated shoot-through current flows internally, and malfunctions occur due to the false recognition of the pin state as an input signal become possible.

5. Clock signals

   After applying a reset, only release the reset line after the operating clock signal becomes stable. When switching the clock signal during program execution, wait until the target clock signal is stabilized. When the clock signal is generated with an external resonator or from an external oscillator during a reset, ensure that the reset line is only released after full stabilization of the clock signal. Additionally, when switching to a clock signal produced with an external resonator or by an external oscillator while program execution is in progress, wait until the target clock signal is stable.

6. Voltage application waveform at input pin

   Waveform distortion due to input noise or a reflected wave may cause malfunction. If the input of the CMOS device stays in the area between $V_{IL}$ (Max.) and $V_{IH}$ (Min.) due to noise, for example, the device may malfunction. Take care to prevent chattering noise from entering the device when the input level is fixed, and also in the transition period when the input level passes through the area between $V_{IL}$ (Max.) and $V_{IH}$ (Min.).

7. Prohibition of access to reserved addresses

   Access to reserved addresses is prohibited. The reserved addresses are provided for possible future expansion of functions. Do not access these addresses as the correct operation of the LSI is not guaranteed.

8. Differences between products

   Before changing from one product to another, for example to a product with a different part number, confirm that the change will not lead to problems. The characteristics of a micro processing unit or microcontroller unit products in the same group but having a different part number might differ in terms of internal memory capacity, layout pattern, and other factors, which can affect the ranges of electrical characteristics, such as characteristic values, operating margins, immunity to noise, and amount of radiated noise. When changing to a product with a different part number, implement a system-evaluation test for the given product.

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(Rev.4.0-1 November 2017)

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