SX126x-FM33LE0xx-SDK 介绍

V1.1

Table of Contents

List of Figures

List of Tables

1 概述

1.1 工程简介

代码 sx126x-fm33le0xx-sdk 是针对节点间功能的测试，可以使用 LoRa 或者 GFSK 方式进行通信测试。使用的硬件是以复旦微电子的 FM33LE026 芯片为 MCU、Semtech 的 SX126x 系列为射频芯片组成的节点。

注：本代码工程不针对 LoRaWAN 网关。

1.2 硬件介绍

复旦微电子的 FM33LE0xx 系列芯片包含如下图所示：

型号	Flash 容量（KBytes）	RAM 容量（KBytes）	封装
FM33LE026	128	16	LQFP64
FM33LE025	128	16	LQFP48
FM33LE023	128	16	QFN32
FM33LE022	128	16	TSSOP24
FM33LE016	64	16	LQFP64
FM33LE015	64	16	LQFP48
FM33LE013	64	16	QFN32
FM33LE012	64	16	TSSOP24

Figure 1: FM33LE0xx 系列

本工程支持的射频芯片是 Semtech 的 SX126x 系列，包括 SX1261/SX1262/SX1268。针对此系列芯片，Semtech 设计了多款 EVK 测试板，本代码工程所支持的 EVK 列表详情请看根目录中的 README.md 文档。同时，与复旦微电子合作，复旦微设计了可以与 EVK 板直接对插的测试板，客户拿到整套测试板和代码后就可以直接进行芯片性能测试。硬件示例如下图所示：

Figure 2: 硬件设备

1.3 软件工程介绍

1.3.1 软件 demo

本工程提供了 7 个测试 demo，列表如下图所示：

Figure 3: 软件 demo 列表

每个 demo 所实现的功能请看对应工程下的 README.md 文档。

1.3.2 使用到的硬件引脚

在整个工程中，所使用到的 MCU 硬件引脚都放到了头文件 modem_pinout.h 中，客户可根据需要进行相应修改，如下如所示：

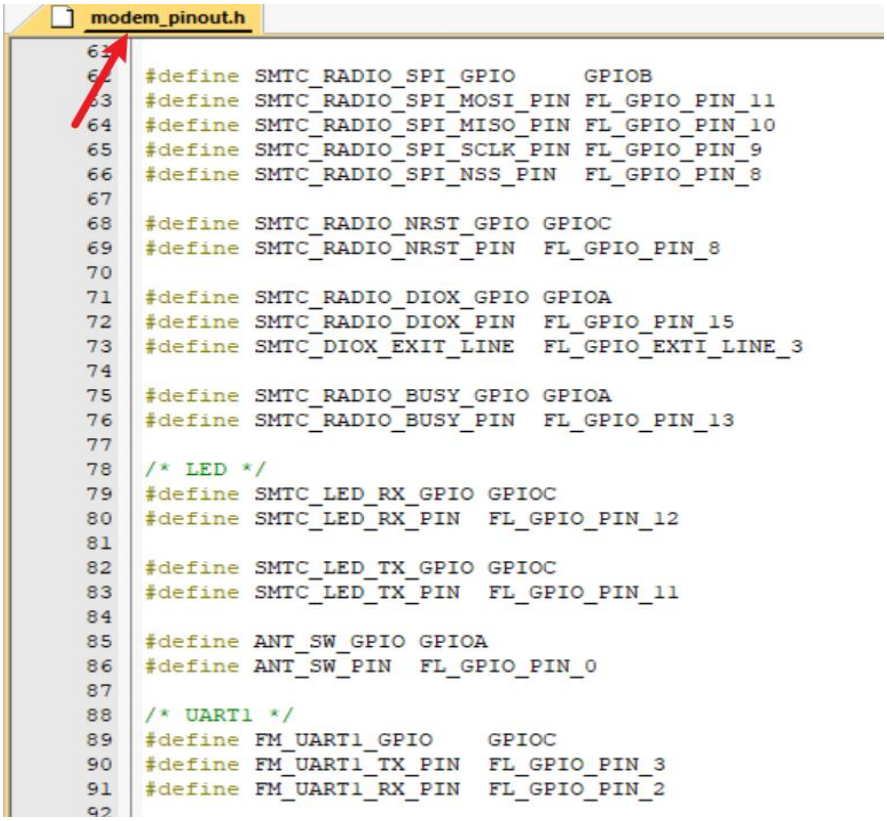
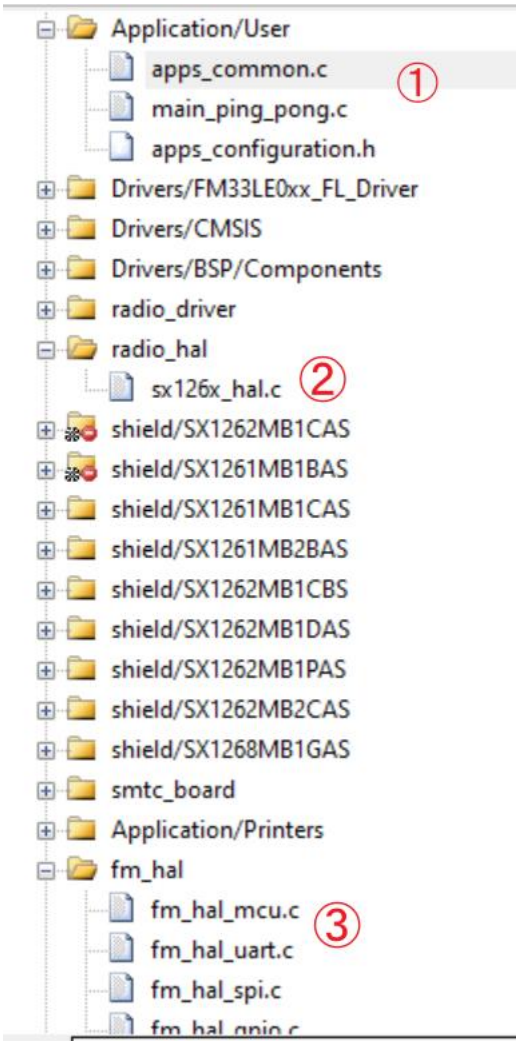


Figure 4: 使用的引脚列表

1.3.3 修改工程

客户如果想在此工程的基础上修改为自己的工程，需要关心的文件如下图中的①、②、③所示：



1.3.4 参数配置

如果要选择 LoRa 或者 GFSK，然后配置不同的 SF、frequency 等参数，直接在 apps_configuration.h 文件中修改即可实现。

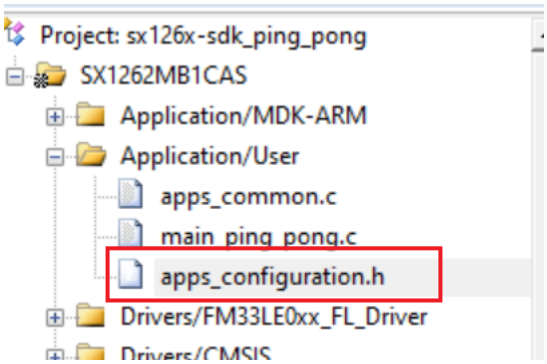


Figure 5: 参数配置

2 工程测试举例

如果要测试此 SDK 中所有工程，需要准备两套硬件测试板，一套用于发送 TX，一套用于接收 RX。下表列出了如何选择软件工程下载到测试板进行测试。

Table 2-1 工程测试列表

<table>
<tr><th>功能</th><th>TX Project</th><th>RX Project</th></tr>
<tr><td rowspan="3">CAD</td><td>sx126x-sdk_tx_infinite_preamble</td><td>sx126x-sdk_cad</td></tr>
<tr><td>sx126x-sdk_per_transmitter</td><td>sx126x-sdk_cad_then_receive</td></tr>
<tr><td>sx126x-sdk_cad_then_transmit</td><td>sx126x-sdk_per_receiver</td></tr>
<tr><td>PER</td><td>sx126x-sdk_per_transmitter</td><td>sx126x-sdk_per_receiver</td></tr>
<tr><td>Ping Pong</td><td colspan="2">sx126x-sdk_ping_pong</td></tr>
<tr><td>Spectral scan</td><td>sx126x-sdk_tx_cw or sx126x-sdk_tx_infinite_preamble</td><td>sx126x-sdk_spectral_scan</td></tr>
<tr><td>Spectrum display</td><td>sx126x-sdk_tx_cw or sx126x-sdk_tx_infinite_preamble</td><td>sx126x-sdk_spectrum_display</td></tr>
<tr><td>sx126x-sdk_tx_cw</td><td colspan="2" rowspan="2">这两个工程比较简单，只是一种信号发射，可以配着以上工程检测信号状态，或者有条件的，在频谱仪上观察波形状态。</td></tr>
<tr><td>sx126x-sdk_tx_infinite_preamble</td></tr>
</table>

3 注意事项

3.1 README

每个工程下的 README，一定要读，这是每个工程的简单介绍，对这个工程实现的功能的一个概括。

3.2 选择不同测试板

如果要测试不同芯片比如 SX1261、SX1262 和 SX1268，首先，需要选择硬件 EVK 板，然后在软件工程中选择对应的 Target 进行编译、下载。如下图：

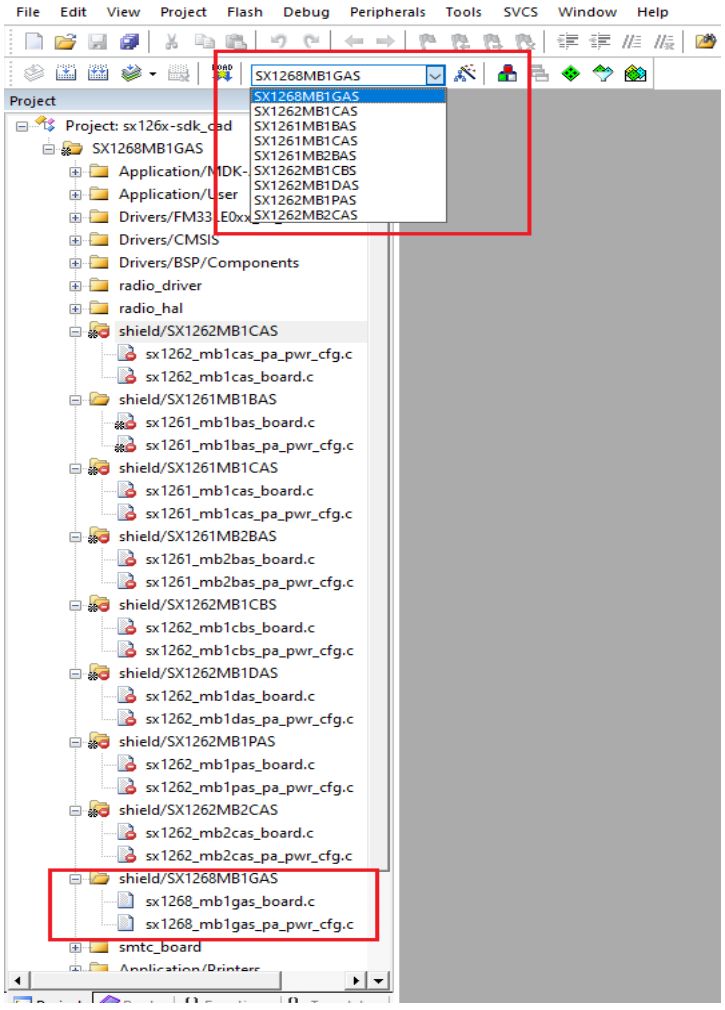


Figure 6: Target 选择

3.3 同一目录下多工程

当在同一目录下有多个 keil 工程时，编译、下载，有时候会出现下载固件错乱的情况。解决方法有两种：

第一种：编译时不要选择 Build，而是选择 Rebuild 去编译。

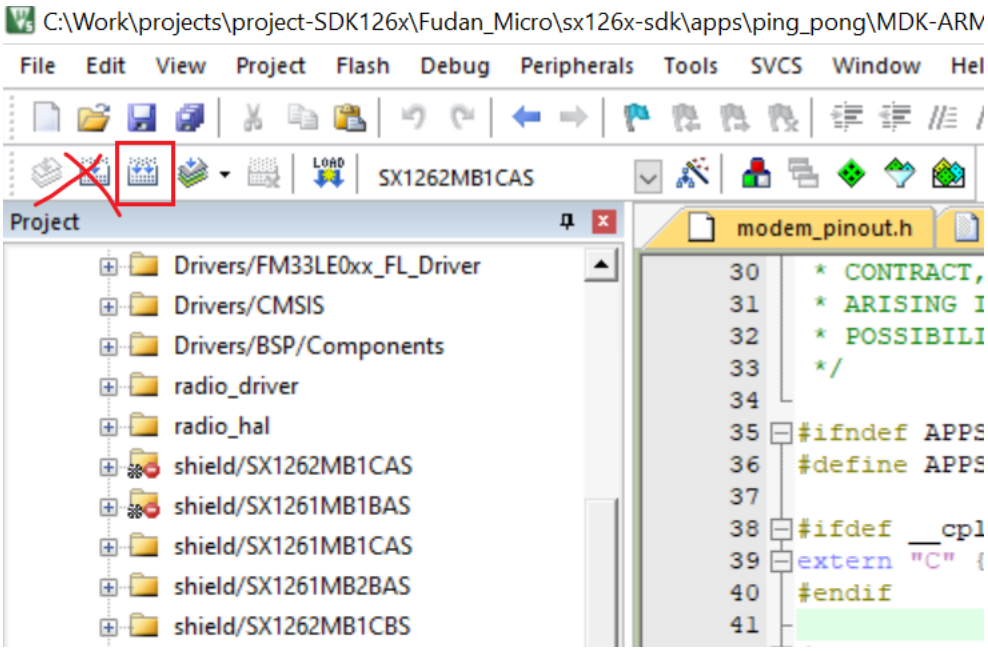


Figure 7: rebuild

第二种：编译前先选择 Clean Target 清除一下，再选择 Build。

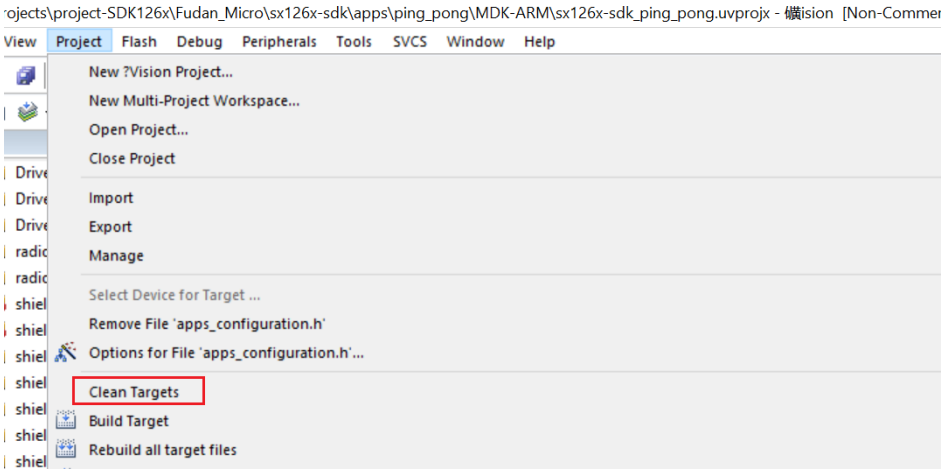


Figure 8: clean target

4 EVK 板资料官网下载

Table 4-1 EVK 板官网

Shield	PCB	官网网址
SX1261MB1BAS	E406v03a	Development Kit, SX1261, 868 MHz for Europe | Semtech
SX1261MB1CAS	E449V01A	Development Kit, SX1261, 923 MHz for Asia | Semtech
SX1261MB2BAS	E498V01A	Mbed Shield, SX1261, 868 MHz for Europe | Semtech
SX1262MB1CAS	E428V03A	Development Kit, SX1262, 915 MHz for North America | Semtech
SX1262MB1CBS	E449V01A	Development Kit, SX1262, 923 MHz for Korea | Semtech
SX1262MB1DAS	E449V01A	Development Kit, SX1262, 866 MHz for India | Semtech
SX1262MB1PAS	E449V01A	Development Kit, SX1262, 915 MHz for Australia and North America | Semtech
SX1262MB2CAS	E499V01B	Mbed Shield, SX1262, 915 MHz for North America | Semtech
SX1268MB1GAS	E512V01A	Development Kit, SX1268, 490 MHz for China and Asia | Semtech

5 Revision History

Version	Date	Changes and/or Modifications
1.0	November 25,2022	Initial Version
1.1	February 17,2023	Rewrite all the contents

Important Notice

Information relating to this product and the application or design described herein is believed to be reliable, however such information is provided as a guide only and Semtech assumes no liability for any errors in this document, or for the application or design described herein. Semtech reserves the right to make changes to the product or this document at any time without notice. Buyers should obtain the latest relevant information before placing orders and should verify that such information is current and complete. Semtech warrants performance of its products to the specifications applicable at the time of sale, and all sales are made in accordance with Semtech's standard terms and conditions of sale.

SEMTECH PRODUCTS ARE NOT DESIGNED, INTENDED, AUTHORIZED OR WARRANTED TO BE SUITABLE FOR USE IN LIFE-SUPPORT APPLICATIONS, DEVICES OR SYSTEMS, OR IN NUCLEAR APPLICATIONS IN WHICH THE FAILURE COULD BE REASONABLY EXPECTED TO RESULT IN PERSONAL INJURY, LOSS OF LIFE OR SEVERE PROPERTY OR ENVIRONMENTAL DAMAGE. INCLUSION OF SEMTECH PRODUCTS IN SUCH APPLICATIONS IS UNDERSTOOD TO BE UNDERTAKEN SOLELY AT THE CUSTOMER'S OWN RISK. Should a customer purchase or use Semtech products for any such unauthorized application, the customer must indemnify and hold Semtech and its officers, employees, subsidiaries, affiliates, and distributors harmless against all claims, costs damages and attorney fees which could arise.

Contact Information

Semtech Corporation
Wireless & Sensing Products
200 Flynn Road, Camarillo, CA 93012
E-mail: sales@semtech.com
Phone: (805) 498-2111, Fax: (805) 498-3804
www.semtech.com