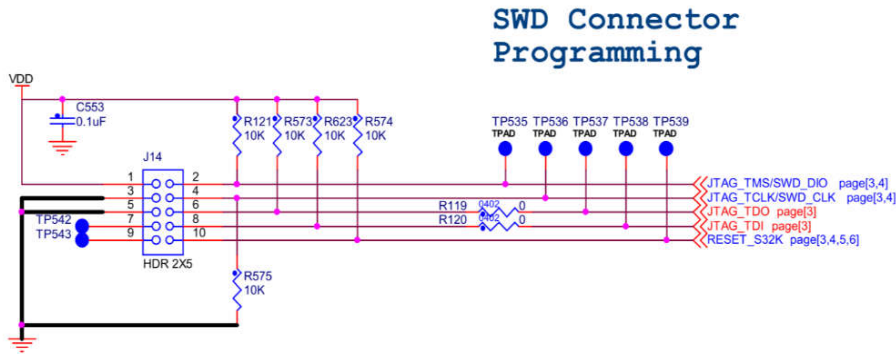
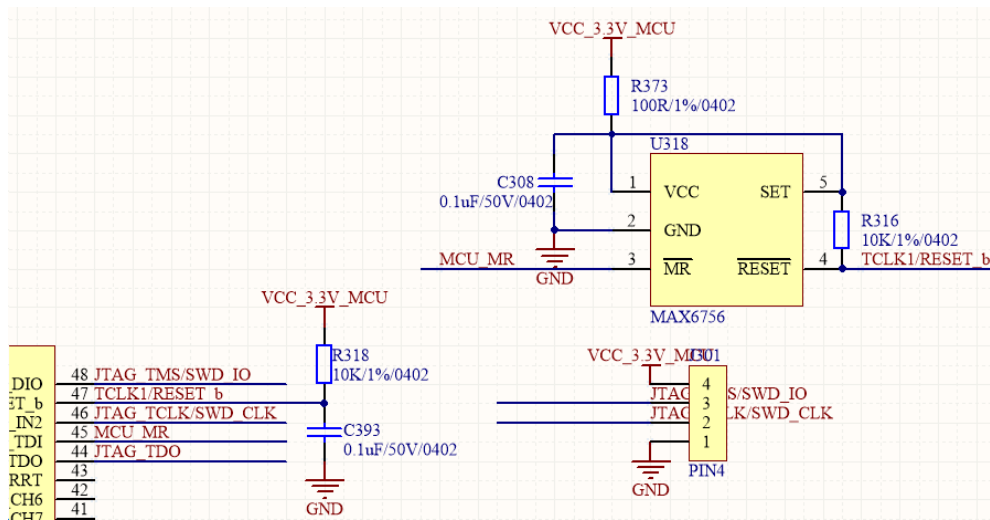


1、硬件下载口区别

1.1 官方给出的原理图下载接口



1.2 我们的下载电路



硬件电路区别：

官方下载口的 DIO、RESET 引脚接了 10K 的上拉电阻，CLK 引脚接了 10K 的下拉电阻，我们的原理图没有使用 RESET 引脚，也未接上下拉电阻，而且单片机的复位引脚接到了复位芯片的复位输出控制引脚。

尝试的解决办法：

拆掉了复位芯片，用示波器看 RESET 脚电平，发现输出 0~1V 左右的斜坡脉冲，怀疑单片机复位脚电容有问题，拆掉电容之后，示波器测量复位引脚输出周期性的尖峰脉冲，然后恢复电容，万用表测量为 0.9V 左右的电压，所以这个周期性的脉冲是由单片机输出的。

NXP 社区给出的解释是芯片加密保护了，链接有详细解释。

https://mp.weixin.qq.com/s?_biz=Mzi0MDk0ODcxMw==&mid=2247484245&idx=1&sn=3561b3bada7ab46acb3747ed9837769c&chksm=e91247d3de65cec51fb4b88556593da08b5e8613c2f487abbe593a7879cecdfb598b51ce11&scene=21#wechat_redirect

2、 根据网上给的解决办法进行解锁，有时成功有时不成功，

解锁不成功

```
J-Link>unlock kinetis
Unlocking device...ERROR: Read from DP/AP register failed!
J-Link>unlock kinetis
Unlocking device...ERROR: Read from DP/AP register failed!
```

解锁成功

```
Found SWD-DP with ID 0x0BC11477
CoreSight AP[0]: 0x04770031, AHB-AP
CoreSight AP[1]: 0x001C0020, JTAG-AP
Found SWD-DP with ID 0x0BC11477
CoreSight AP[0]: 0x04770031, AHB-AP
CoreSight AP[1]: 0x001C0020, JTAG-AP
Unlocking device...O.K.
```

3、解锁成功之后进行擦除仅有几次成功,而且成功之后如果中间重新上过电芯片又会锁死。网上给出的解释是:加密位被置1了,因为擦除会将FLASH区刷成0xFF,因此芯片又锁住了

解锁后无法进行擦除的信息

```
Connecting ...
- Connecting via USB to J-Link device 0
- Target interface speed: 2000 kHz (Auto)
- VTarget = 3.380V
- Executing init sequence ...
- Executing Reset (0, 0 ms)
- Initialized successfully
- Target interface speed: 200 kHz (Fixed)
- J-Link found 1 JTAG device. Core ID: 0x0BC11477
(None)
- Connected successfully
Erasing chip ...
- 128 sectors, 1 range, 0x0 - 0x3FFFF
- Start of preparing flash programming
- ERROR: Verification of RAMCode failed @
address 0x1FFFC00.
Write: 0xA801BE00 F0009900
Read: 0x00000000 00000000
- ERROR: Failed to prepare for programming.
Failed to download RAMCode!
- End of preparing flash programming
- ERROR: Failed to erase chip
Disconnecting ...
- Disconnected
```

4、解锁后偶尔可以实现擦除操作，利用 JLINK COMMANDER 可以进行连接读取一些寄存器的信息，但是无法用 JFLASH 下载程序

5、解锁后利用 JFLASH 偶尔可以读取整个芯片的存储区信息，进行擦除操作然后将程序写进去也成功，但是在擦除后芯片又被上锁。再次出现解锁有时成功有时失败。

6、启动代码中已经配置为不加锁（排除软件问题）

```
220 ; </h>
221 ; <h> Flash security byte (FSEC)
222 ; <i> WARNING: If SEC field is configured as "MCU security status is secure" and MEEN field is configured as
223 ; <i> MCU's security status cannot be set back to unsecure state since Mass erase via the debugger is blocke
224 ; <0.0..1> SEC
225 ; <2=> MCU security status is unsecure
226 ; <3=> MCU security status is secure
227 ; <i> Flash Security
228 ; <0.2..3> FSLACC
229 ; <2=> Freescale factory access denied
230 ; <3=> Freescale factory access granted
231 ; <i> Freescale Failure Analysis Access Code
232 ; <0.4..5> MEEN
233 ; <2=> Mass erase is disabled
234 ; <3=> Mass erase is enabled
235 ; <0.6..7> KEYEN
236 ; <2=> Backdoor key access enabled
237 ; <3=> Backdoor key access disabled
238 ; <i> Backdoor Key Security Enable
239 FSEC EQU 0xFE

Flash security byte (FSEC)
> WARNING: If SEC field is configured as "MCU security status is secure" and MEEN field is configured as
> MCU's security status cannot be set back to unsecure state since Mass erase via the debugger is blocked !!!
.0..1> SEC
<2=> MCU security status is unsecure
<3=> MCU security status is secure
<i> Flash Security
.2..3> FSLACC
<2=> Freescale factory access denied
<3=> Freescale factory access granted
<i> Freescale Failure Analysis Access Code
.4..5> MEEN
<2=> Mass erase is disabled
<3=> Mass erase is enabled
.6..7> KEYEN
<2=> Backdoor key access enabled
<3=> Backdoor key access disabled
<i> Backdoor Key Security Enable
EQU 0xFE
```