

# **MSPM0G3519 Flash Bank Swap Guide**

**MSP HSM Apps**

# Bank Swap Function Description

- G3519 will include two code bank:

Table 6-11. Bank Address Swap Translation

Bank and Region	Address Space Before Swap	Address Space After Swap
BANK0 MAIN	0x0000.0000 – 0x0003.FFFF	0x0004.0000 – 0x0007.FFFF
BANK1 MAIN	0x0004.0000 – 0x0007.FFFF	0x0000.0000 – 0x0003.FFFF

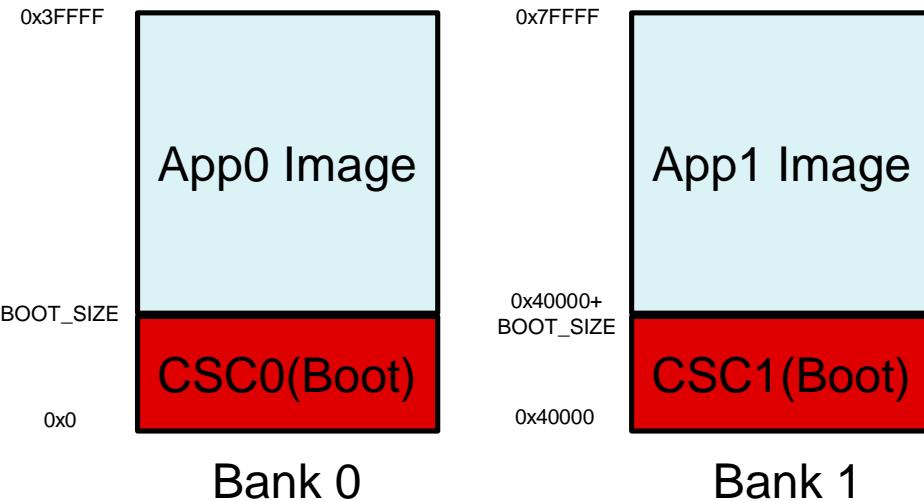
- MCU will run in BANK0 default after POR/BOR
- Bank swap function need to enable by change NONMAIN region
  - Enable CSC function
  - INITDONE will not auto release
- Swap bank from bank0 to bank1
  - Set swap bit:  
`DL_SYSCTL_executeFromUpperFlashBank(); // set swap bank to bank1`
  - Issue INITDONE(This will trigger System Reset, and enable bank swap):  
`DL_SYSCTL_issueINITDONE(); // Issue INITDOEN to trigger System Reset -> swap to bank1`
- Swap bank from bank1 to bank0
  - Trigger BOOT Reset:  
`DL_SYSCTL_resetDevice(DL_SYSCTL_RESET_BOOT); // trigger BOOT Reset -> swap to bank0`

# Bank Swap Function Description

- G3519 will include two code bank:

Table 6-11. Bank Address Swap Translation

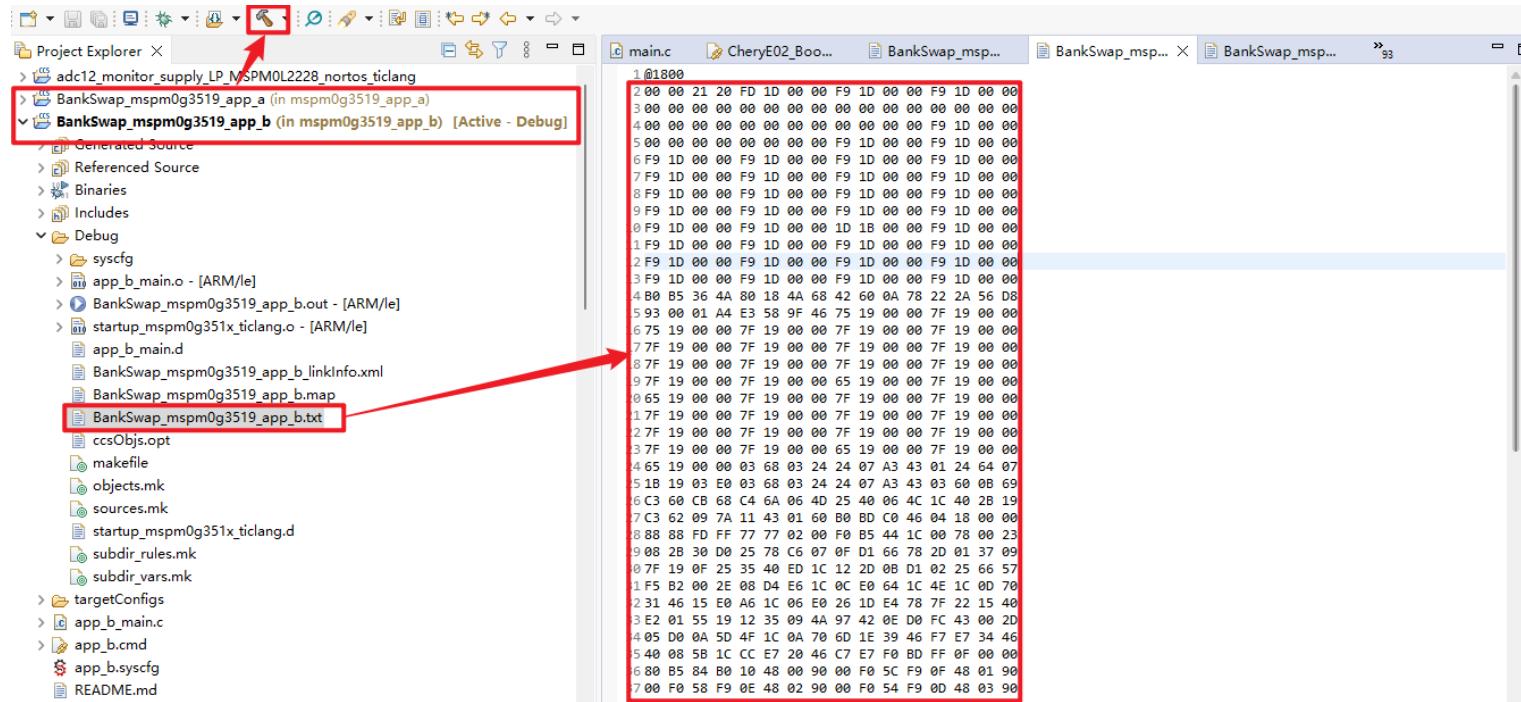
Bank and Region	Address Space Before Swap	Address Space After Swap
BANK0 MAIN	0x0000.0000 – 0x0003.FFFF	0x0004.0000 – 0x0007.FFFF
BANK1 MAIN	0x0004.0000 – 0x0007.FFFF	0x0000.0000 – 0x0003.FFFF



- In a bank swap situation, there are four parts of code in Flash MAIN region:
  - App0 image in bank0
  - App1 image in bank1
  - CSC0 code in bank0 root address, which determine bank swap policy and release INITDONE.
  - CSC1 code in bank1 root address, which has the same code with CSC0 and will directly jump to App1 code.

# Hands on

Step 1: Built the application example of bank0 & bank1, and generate .txt output file.



# Hands on

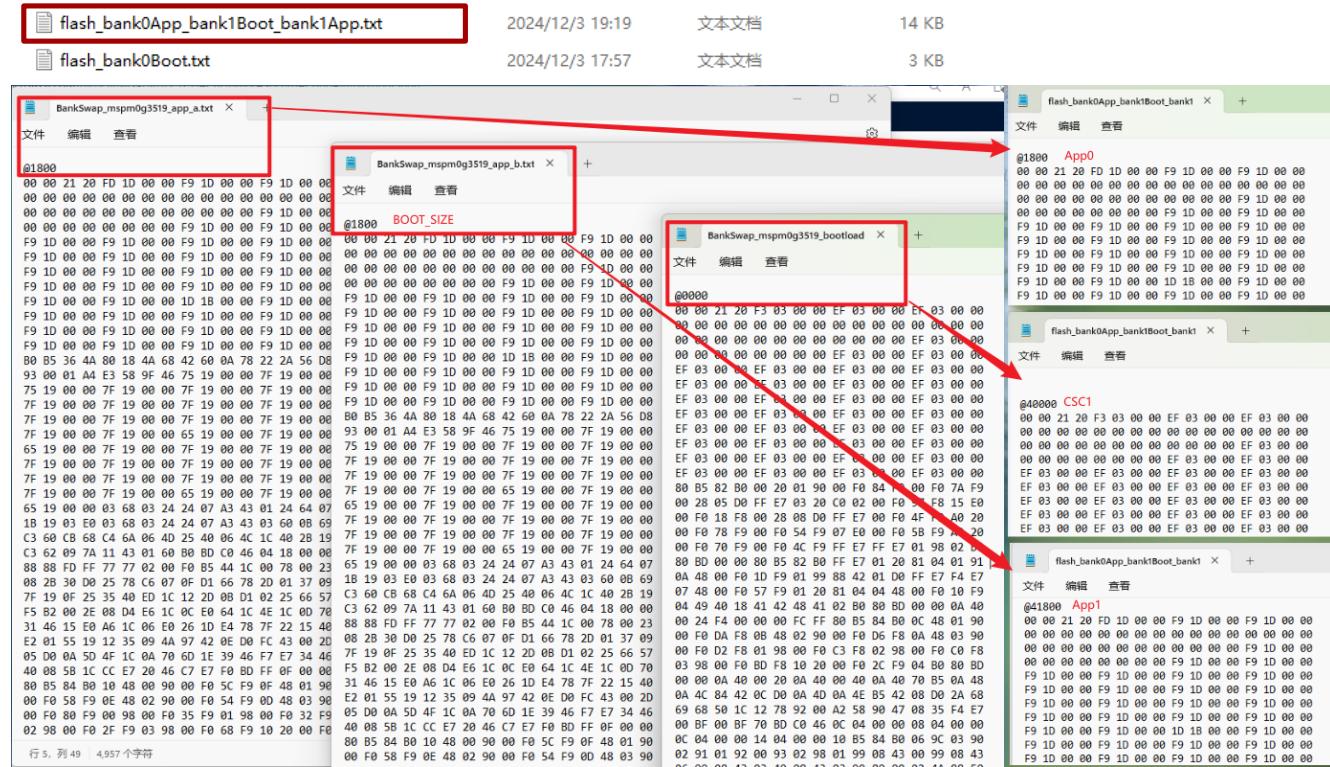
Step 2: Built the application example of boot, the generated .txt data will be place at both 0x0000 address and 0x40000 address.

The screenshot shows the TI Code Composer Studio interface. On the left, the Project Explorer window displays various source files and build configurations. A red box highlights the 'BankSwap\_mspm0g3519\_boot' entry under the CheryE02\_Bootloader configuration. Another red box highlights the 'BankSwap\_mspm0g3519\_bootloader.txt' file within the project. On the right, the Registers window shows memory starting at address 0x0000. A red arrow points from the highlighted file in the Project Explorer to the memory dump in the Registers window, indicating that the file's contents are being loaded into memory at those addresses. The memory dump shows binary data starting with 1B 00 00.

```
1B 00 00  
20 00 21 20 F3 A3 00 00 FF 03 00 00 FF A3 00 00  
30 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00  
40 00 00 00 00 00 00 00 00 00 00 00 EF 03 00 00  
50 00 00 00 00 00 00 00 00 00 00 00 EF 03 00 00  
6EF 03 00 00 EF 03 00 00 EF 03 00 00 EF 03 00 00  
7EF 03 00 00 EF 03 00 00 EF 03 00 00 EF 03 00 00  
8EF 03 00 00 EF 03 00 00 EF 03 00 00 EF 03 00 00  
9EF 03 00 00 EF 03 00 00 EF 03 00 00 EF 03 00 00  
10EF 03 00 00 EF 03 00 00 EF 03 00 00 EF 03 00 00  
11EF 03 00 00 EF 03 00 00 EF 03 00 00 EF 03 00 00  
12EF 03 00 00 EF 03 00 00 EF 03 00 00 EF 03 00 00  
13EF 03 00 00 EF 03 00 00 EF 03 00 00 EF 03 00 00  
1480 B5 B2 B0 00 20 01 90 00 F0 84 F9 00 F0 7A F9  
1500 28 05 D0 FF E7 03 20 C0 02 00 F0 97 F8 15 E0  
1600 F0 18 F8 00 28 00 D0 FF E7 00 F0 4F F9 A0 20  
1700 F0 78 F9 00 F0 54 F9 07 E0 00 F0 58 F9 A0 20  
1800 F0 70 F9 00 F0 4C F9 FF E7 01 98 02 B0  
1980 BD 00 00 80 B5 B2 B0 FF E7 01 20 81 04 01 91  
2004 48 00 F0 1D F9 01 99 88 42 01 D0 FF E7 F4 E7  
2107 48 00 F0 57 F9 01 20 81 04 04 48 00 F0 10 F9  
2204 49 F4 00 00 00 FC FF 00 B5 84 B0 00 00 0A 40  
2300 24 F4 00 00 00 FC FF 00 B5 84 B0 00 00 0A 40  
2400 F0 DA F8 08 02 98 00 F0 D6 F8 0A 48 03 98  
2500 F0 D2 F8 01 98 00 F0 C3 F8 02 98 00 F0 C0 F8  
2603 98 00 F0 BD F8 10 20 00 F0 2C F9 04 B0 80 BD  
2700 00 0A 40 00 20 0A 40 00 40 0A 40 7B 05 B0 A8  
2804 4C 84 42 0C D0 0A 4D 0A 4E B5 42 08 D0 2A 68  
2969 68 50 1C 12 78 92 00 A2 58 90 47 05 35 F4 E7  
3000 BF 00 BF 70 BD C0 46 0C 04 00 00 00 04 00 00  
310C 04 00 00 14 04 00 00 18 B5 84 B0 00 9C 03 96  
3202 91 01 92 00 93 02 98 01 99 08 43 00 99 04 43  
3306 99 08 43 03 49 00 43 03 99 89 00 02 4A 88 58  
3404 B0 10 BD 81 00 04 00 04 08 42 40 85 B2 80  
3501 90 01 99 06 48 01 60 01 99 06 4A 11 60 01 99  
3608 68 60 46 00 68 40 68 00 47 02 B0 80 BD C0 46  
3700 00 20 20 00 ED 00 E0 84 B0 03 90 02 91 01 92  
3803 98 00 68 00 90 00 98 01 99 88 43 00 98 00 98  
3902 99 01 9A 11 40 00 43 03 99 08 60 00 B0 70 47  
4008 48 F0 88 F3 00 88 00 BF 00 F0 C4 F8 00 28  
4101 D0 FF F7 93 FF 00 20 FF F7 22 FF 01 20 00 F0  
42BC F8 C0 46 00 00 21 20 B5 B2 B0 00 20 01 98  
4300 F0 4E F8 01 98 00 F0 17 F8 01 98 00 F0 22 F8  
4401 98 00 F0 03 F0 02 B0 00 00 00 00 00 00 00 00 00  
4501 46 01 A8 01 70 01 78 02 48 0F 22 FF F7 BC FF  
4602 B0 00 BD 04 01 00 48 00 B5 B2 B0 01 46 01 A8  
4701 70 01 78 02 48 03 22 FF F7 AE FF 02 B0 80 BD  
4800 01 00 40 00 85 B2 B0 01 46 01 A8 01 70 01 78
```

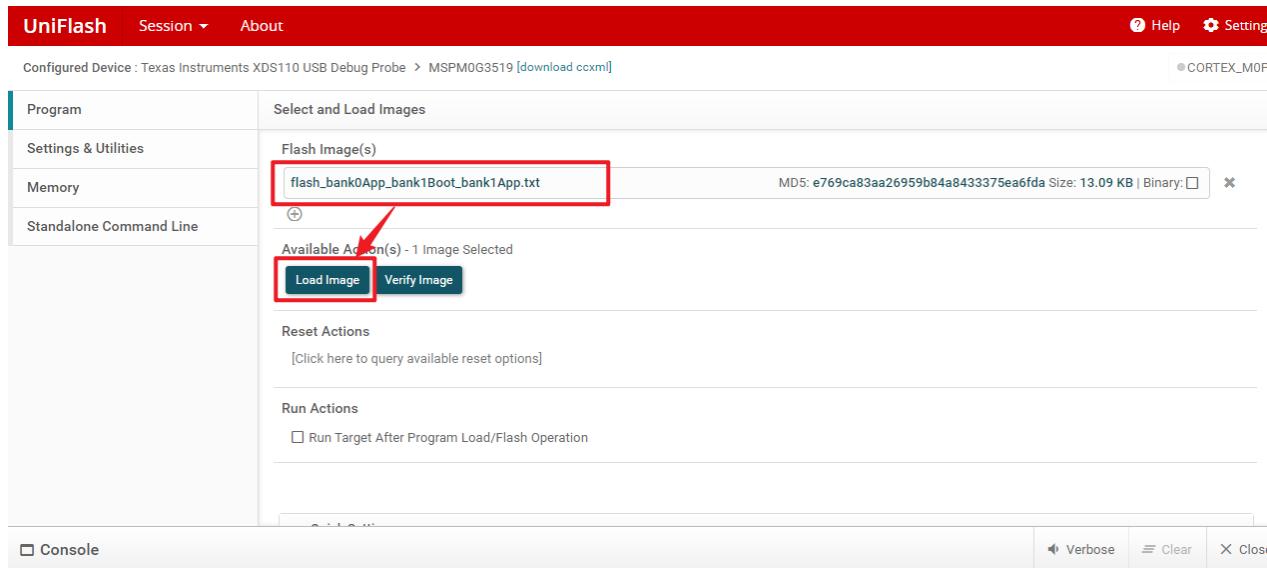
# Hands on

Step 3: Generate the image file of App0 + App1 + CSC1. (flash\_bank0App\_bank1Boot\_bank1App.txt)



# Hands on

Step 4: Download the image by Uniflash . (May need repower MCU after downloading)



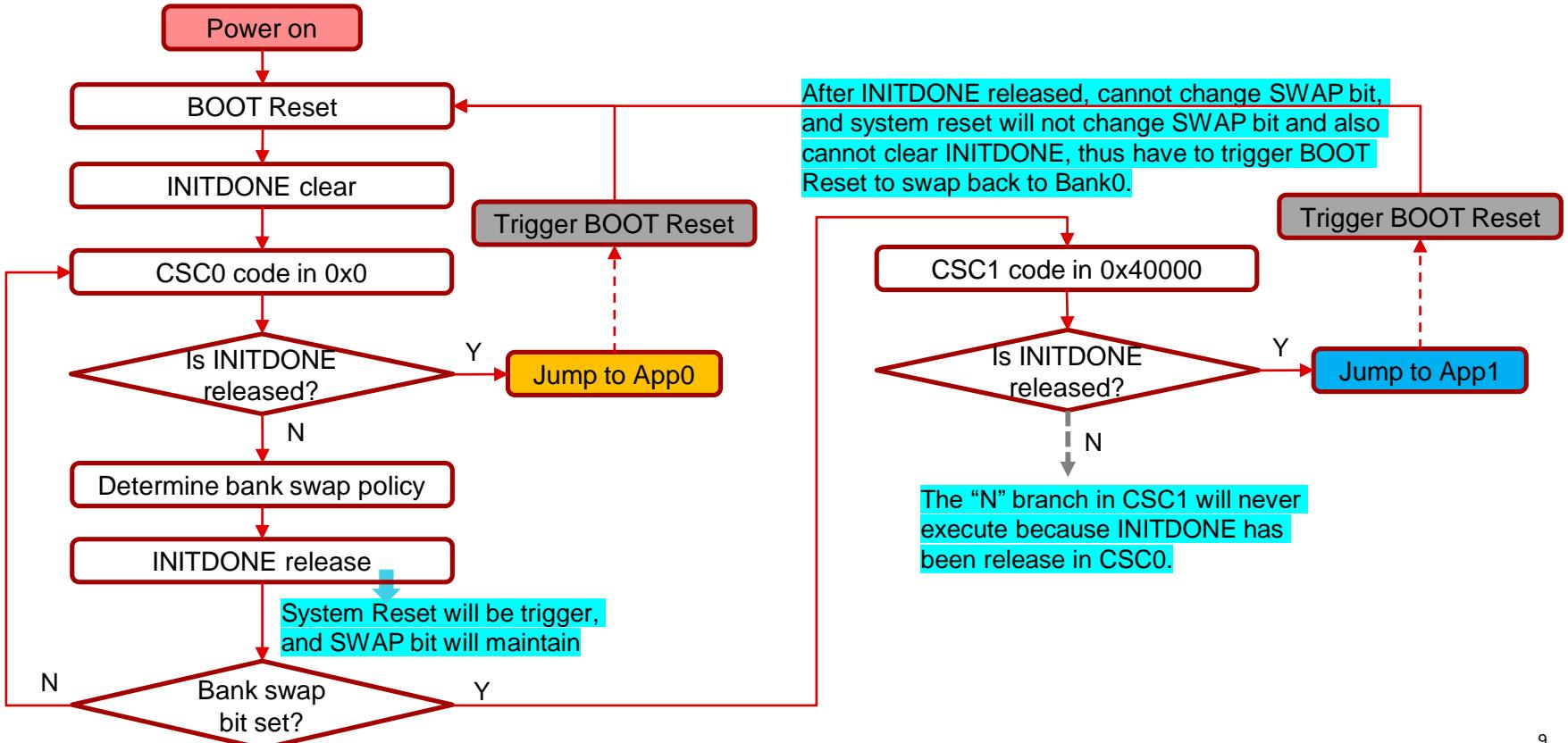
# Hands on

Step 5: Download and debug CSC0, which including the change of NONMAIN.

- Press S1 less than 0.5s -> run in bank0, blue led fast flashing
- Press S1 more than 0.5s -> run in bank1, green led slow flashing

The screenshot shows the TI IDE interface. On the left, the Project Explorer displays the project structure for 'BankSwap\_mspmg3519 boot (in CheryE02 Bootloader)'. The main window shows the code editor for the 'main.c' file, which includes comments about CSC0 and NVM configurations. On the right, the 'PROJECT CONFIGURATION (1)' tab is selected, specifically the 'Configuration NVM' section under 'SYSTEM (10)'. This section contains various configuration options, with two checkboxes highlighted by red arrows: 'Accept configuration risks' and 'Enable Flash Bank Swap Policy'. A note below the first checkbox states: 'For password fields in this device user should provide the SHA-2 256 hash of the password. See description for more details.' The 'Enable Flash Bank Swap Policy' checkbox is checked. Other sections visible include 'Boot Configuration Routine (BCR) Configuration', 'Debug Security Policy Configuration', 'SWD Mass Erase and Factory Reset Configuration', 'Flash Memory Static Write Protection (SWP) Configuration (Bank 0)', and 'Flash Memory Static Write Protection (SWP) Configuration (Bank 1)'. The 'Enable CSC Policy' checkbox is also checked in the 'Flash Memory Static Write Protection (SWP) Configuration (Bank 1)' section.

# Swap Flow



# More Resource

Secure Boot Example, will include Bank swap feature

Windows (C:) > ti > (mspm0_sdk_2_02_00_05 > examples > nortos > LP_MSPM0G3519 > boot_manager > customer_secure_code)				
	Name	Date modified	Type	Size
	flash_map_backend	9/5/2024 2:14 PM	File folder	
	mcuboot_config	9/5/2024 2:14 PM	File folder	
	sysflash	9/5/2024 2:14 PM	File folder	
	third_party	9/5/2024 1:40 PM	File folder	
it	ti	9/5/2024 1:40 PM	File folder	
	ticlang	9/5/2024 2:14 PM	File folder	
	aes_cmac.c	8/30/2024 11:04 AM	C File	12 KB
	aes_cmac.h	8/30/2024 11:04 AM	H File	3 KB
	boot_config.c	8/30/2024 11:04 AM	C File	7 KB
	boot_config.h	8/30/2024 11:04 AM	H File	16 KB
	boot_keys.c	8/30/2024 11:04 AM	C File	2 KB
	customer_secure_code.c	8/30/2024 11:04 AM	C File	10 KB
	customer_secure_code.syscfg	8/30/2024 11:04 AM	SYSCFG File	2 KB
	error_code.h	8/30/2024 11:04 AM	H File	2 KB
	hash_verify.c	8/30/2024 11:04 AM	C File	2 KB
	hash_verify.h	8/30/2024 11:04 AM	H File	2 KB
	keystore.c	8/30/2024 11:04 AM	C File	18 KB
	keystore.h	8/30/2024 11:04 AM	H File	4 KB
	lockable_storage_common.h	8/30/2024 11:04 AM	H File	3 KB
	lockable_storage_private.c	8/30/2024 11:04 AM	C File	4 KB
	lockable_storage_private.h	8/30/2024 11:04 AM	H File	3 KB
	lockable_storage_public.h	8/30/2024 11:04 AM	H File	2 KB
	README.html	8/30/2024 11:04 AM	Chrome HTML Document	68 KB
	README.md	8/30/2024 11:04 AM	Markdown file	2 KB
	rollback.c	8/30/2024 11:04 AM	C File	3 KB
	rollback.h	8/30/2024 11:04 AM	H File	2 KB
	secret.c	8/30/2024 11:04 AM	C File	8 KB
	secret.h	8/30/2024 11:04 AM	H File	6 KB