How to boot from LS1043A bare board by flash SD card using CMSIS-DAPMSIS-DAP

When customer only has SD/eMMC on the customer board, when they don't have CWTAP in hand, how do they boot the customer board(bare board) after the board come back from the factory for the first time. This document describes the steps how to use the CMSIS-DAP in this situation as a reference for user.

CMSIS-DAP SUMMARY

As we know, CMSIS-DAP is a protocol specification and a implementation of a firmware that supports access to the CoreSight Debug Access Port (DAP).The various Arm Cortex processors provide CoreSight Debug and Trace. CMSIS-DAP supports target devices that contain one or more Cortex processors. A device provides a Debug Access Port (DAP) typically either with a 5-pin JTAG or with a 2-pin Serial Wired Debug (SWD) interface that connects to a debug unit. CMSIS-DAP is the interface firmware for a debug unit that connects the debug port to USB. Debuggers that execute on a host computer connect via USB and the Debug Unit to the device which runs the application software. For the details of CMSIS-DAP firmware and program steps for LS1043ARDB please refer《How to using CMSIS-DAP in LS1034ARDB》. This guide will use LS1043ARDB as the bare board and share the detail program firmware and steps until bring up. The board or bare board in this documents will represent LS1043ARDB

Now you have a bare board in hand without any programs on the board.

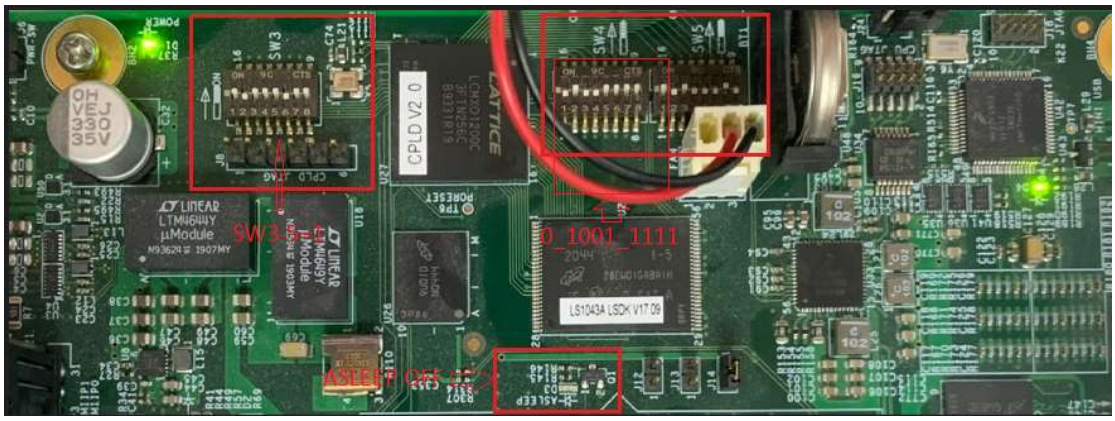
Boot steps for bare board using CMSIS-DAP

1. The board is configured with Hard-Coded RCW. To simply the connection, I use the CMSIS-DAP, mini-USB port as the debug console. The Hard-Coded RCW switch

settings, as shown in the table below.

	1	2	3	4	5	6	7	8
SW3	1	0	1	1	1	0	1	1
SW4	0	1	0	0	1	1	1	1
SW5	1	0	1	0	0	0	1	0

You should setting your switches according to your customer board. Double confirm the picture below:



NOTE

1. The setting SW3[5]=1, Ignore RESET_REQ_B assertion. It is recommended to disconnect RESET_REQ_B from PORESET_B when using Hard-Coded RCW as any different board configuration may push the chip into an endless reset loop. For more information, refer to Hard-coded RCW options QorIQ LS1043A Reference Manual (document LS1043ARM).
2. Hard-coded RCW group by 9 switches, including SW4[1]-SW4[8], SW[5]. For more information, refer to DIP switches part QorIQ LS1043A Reference Design Board Getting Started Guide(LS1043ARDBGSG).

2. Power on the board, if you want to know more connection details, please refer document How to using CMSIS-DAP in LS1034ARDB.

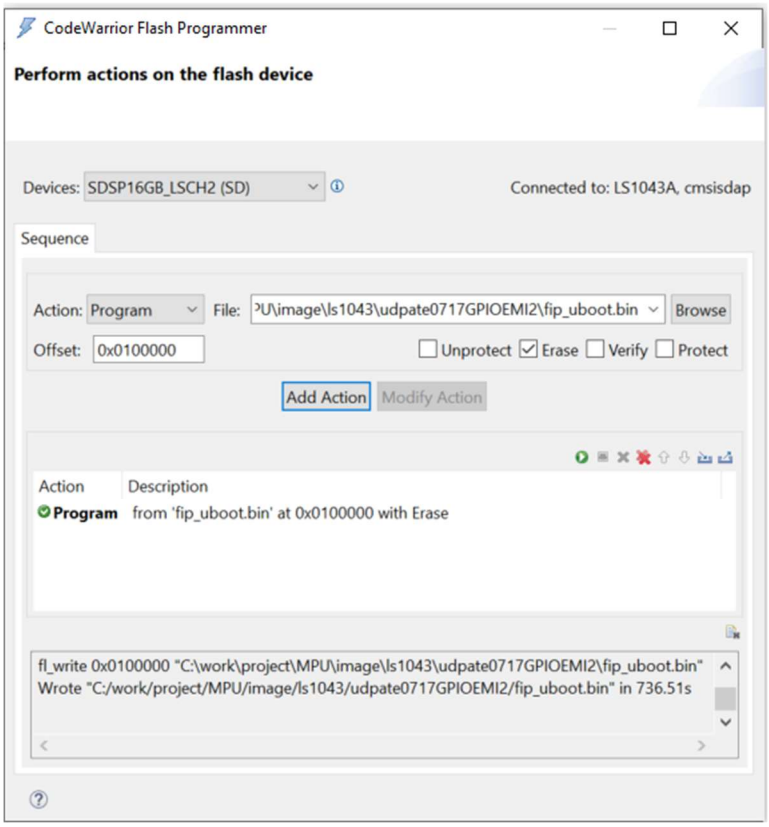
3. Disconnect the Jump J24, Disable reset function. If you use Telnet serial port, then keep J24 in "Open" state; otherwise, it will cause board reset.

4. The ASLEEP LED (D3) also turns ON and turns OFF immediately, indicating that Hard-coded RCW has been loaded. If the ASLEEP LED (D3) always on, please check the step 1-3. Without available RCW is not possible to connect CodeWarrior correctly. See the position in the figure above.

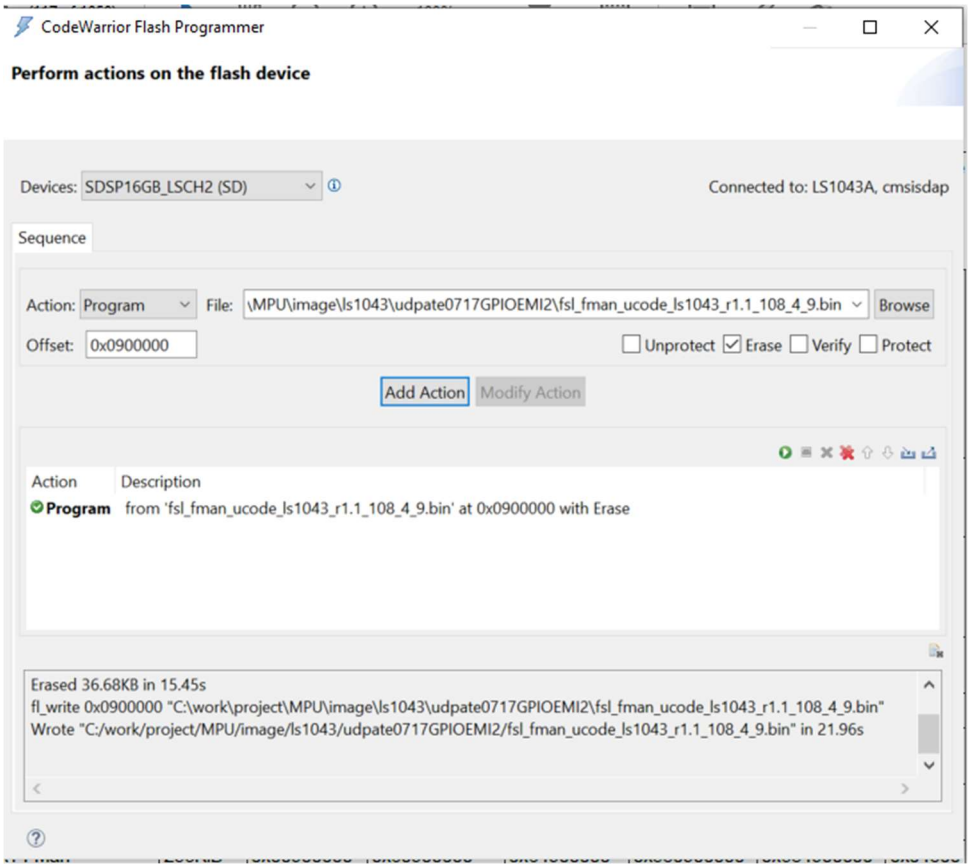
5. Using “Flash Programmer” with CMSIS-DAP . Select the file bl2_sd.pbl which

is generated in */flexbuild_lsdk2108_github/build/firmware/atf/ls1043ardb, please confirm the Offset and options in the capture below.

6. Select the file fip_uboot.bin which is generated in */flexbuild_lsdk2108_github/build/firmware/atf/ls1043ardb, please confirm the Offset and options in the capture below.



7. Select the file fsl_fman_ucode_ls1043_r1.1_108_4_9.bin which is in */flexbuild_lsdk2108_github/components/firmware/fm_ucode/, please confirm the Offset and options in the capture below.



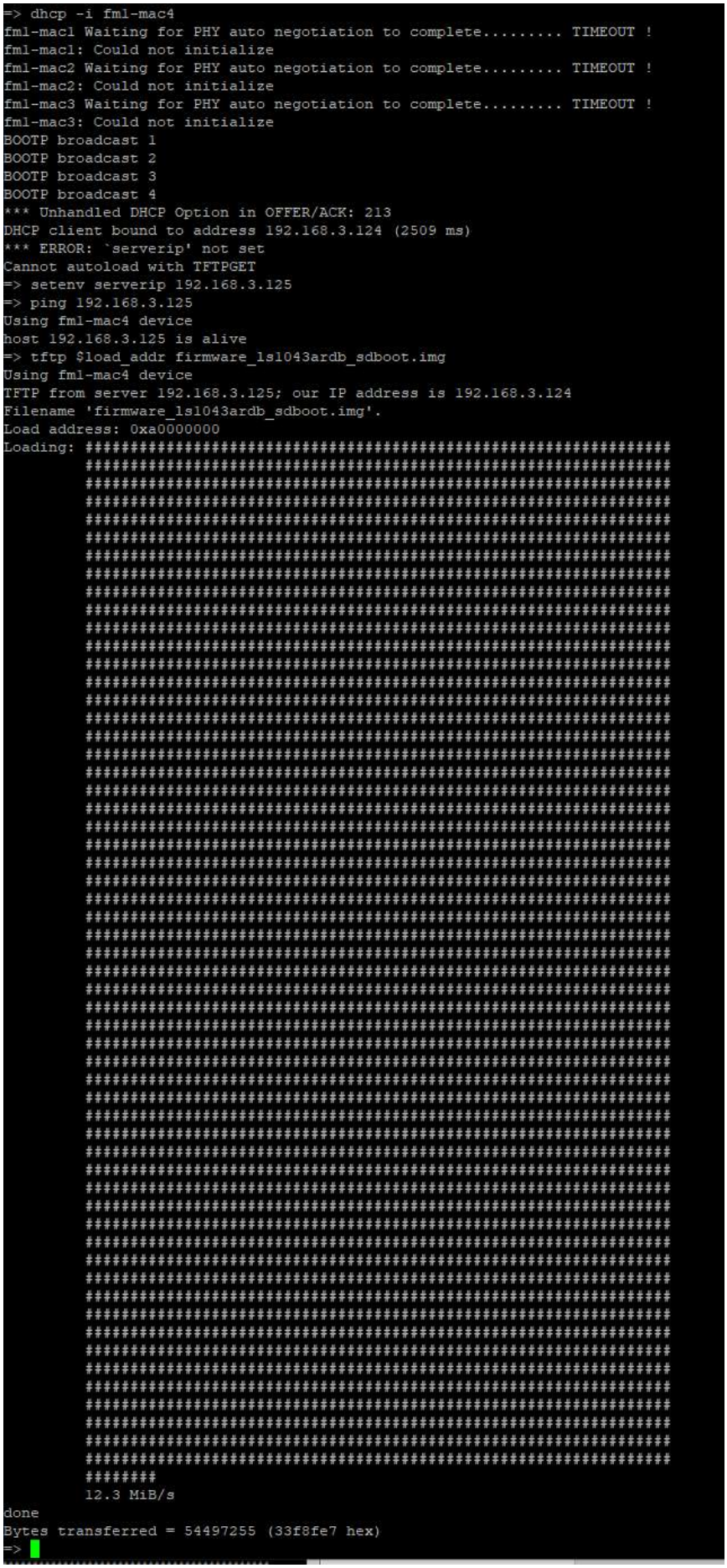
8. When the program completed, power off the board and change the switches setting, see the green highlight part.

	1	2	3	4	5	6	7	8
SW3	1	0	1	1	1	0	1	1
SW4	0	0	1	0	0	0	0	0
SW5	0	0	1	0	0	0	1	0

9. Power on the board, from the debug console, you will get logs below. Hit any key to stop in the U-BOOT. Now the board has been bring up. Here you get a board with U-BOOT and could download and program any image on the U-BOOT.

```
NOTICE:  2 GB DDR4, 32-bit, CL=11, ECC off
NOTICE:  BL2: v2.4(release):LSDK-21.08-0-g340b20bcb-dirty
NOTICE:  BL2: Built : 04:38:56, Jul 19 2023
NOTICE:  BL2: Booting BL31
NOTICE:  BL31: v2.4(release):LSDK-21.08-0-g340b20bcb-dirty
NOTICE:  BL31: Built : 04:38:56, Jul 19 2023
NOTICE:  Welcome to ls1043ardb BL31 Phase


U-Boot 2021.04 (Jul 19 2023 - 04:37:55 -0400)

SoC:  LS1043AE Rev1.1 (0x87920011)
Clock Configuration:
       CPU0(A53):1600 MHz  CPU1(A53):1600 MHz  CPU2(A53):1600 MHz
       CPU3(A53):1600 MHz
       Bus:      400  MHz  DDR:      1600 MT/s  FMAN:     500  MHz
Reset Configuration Word (RCW):
       00000000: 08100010 0a000000 00000000 00000000
       00000010: 14550002 80004012 60040000 c1002000
       00000020: 00000000 00000000 00000000 00038800
       00000030: 00000000 00001100 00000096 00000001
Model: LS1043A RDB Board
Board: LS1043ARDB, boot from SD
CPLD:  V2.0
PCBA:  V6.0
SERDES Reference Clocks:
SD1_CLK1 = 156.25MHZ, SD1_CLK2 = 100.00MHZ
DRAM:  1.9 GiB (DDR4, 32-bit, CL=11, ECC off)
Using SERDES1 Protocol: 5205 (0x1455)
FSL_SDHC: 0

MMC read: dev # 0, block # 18944, count 128 ...
Not a microcode
Flash: 128 MiB
NAND:  512 MiB
MMC:   Loading Environment from MMC... *** Warning - bad CRC, using default environment

EEPROM: NXID v1
In:    serial
Out:   serial
Err:   serial
SEC0:  RNG instantiated
Net:
MMC read: dev # 0, block # 18432, count 128 ...
Fman1: Uploading microcode version 108.4.9
eth0: fm1-mac1, eth1: fm1-mac2, eth2: fm1-mac3, eth3: fm1-mac4, eth4: fm1-mac5, eth5: fm1-mac6, eth6: fm1-mac9
Hit any key to stop autoboot:  0
=>
```

10. Use the tftp to download any firmware you want and flash it on the board. Here the ethernet I use is fm1-mac4.


=> dhcp -i fm1-mac4
fm1-mac1 Waiting for PHY auto negotiation to complete..... TIMEOUT !
fm1-mac1: Could not initialize
fm1-mac2 Waiting for PHY auto negotiation to complete..... TIMEOUT !
fm1-mac2: Could not initialize
fm1-mac3 Waiting for PHY auto negotiation to complete..... TIMEOUT !
fm1-mac3: Could not initialize
BOOTP broadcast 1
BOOTP broadcast 2
BOOTP broadcast 3
BOOTP broadcast 4
*** Unhandled DHCP Option in OFFER/ACK: 213
DHCP client bound to address 192.168.3.124 (2509 ms)
*** ERROR: `serverip' not set
Cannot autoload with TFTPGET
=> setenv serverip 192.168.3.125
=> ping 192.168.3.125
Using fm1-mac4 device
host 192.168.3.125 is alive
=> tftp $load_addr firmware_ls1043ardb_sdboot.img
Using fm1-mac4 device
TFTP from server 192.168.3.125; our IP address is 192.168.3.124
Filename 'firmware_ls1043ardb_sdboot.img'.
Load address: 0xa0000000
Loading:
12.3 MiB/s
done
Bytes transferred = 54497255 (33f8fe7 hex)
=>

11. Write the firmware to SD card..

    => mmc dev 0; mmc write $load_addr 8 1f000

12. Program the firmware to SD card without ethernet.

    If there is ethernet in the board is not available, you could program the lsdk2108_yocto_tiny_LS_arm64.itb in the */flexbuild_lsdk2108_github/build/images, but it will take a long time, maybe many hours and may fail in the process because of the long time link between the debug port and PC. But it is an available way to program image without any CWTAP and ethernet on board available. See the example below, it takes about 6 hours for the program process. So it is recommended to use the steps 1-11 to bring up the bare board.