Getting Started Guide

mmWave Diagnostic & Monitoring TI Design

This demo is a reference application to showcase the usage of device's inbuilt Diagnostic & Monitoring feature using mmWave SafeTI Diagnostic Library (SDL) and RadarSS respectively. This demo assists in the development of software applications involving functional safety. Here is the list of features this demo provides

- Secondary Bootloader (SBL) runs few of destructive diagnostic tests.
- Main application implements remaining diagnostic test and device monitor features.
- TI-RTOS based MSS implementation of diagnostic tests.
- Non-OS based DSS implementation of diagnostic tests.
- All the test status are reported over UART.
- MSS runs periodic diagnostic tests.

Requirements

1. **Hardware and Software Requirements**

Item	Details
Device	AWR1843BOOST, AWR6843ISK, IWR6843ISK.
Computer	PC with Windows 7 or 10. If a laptop is used, please use the 'High Performance' power plan in Windows.
Micro USB Cable	Micro USB cable for mmwave sensor.
Power Supply	5V, >3.0A with 2.1-mm barrel jack (center positive).

Software

Tool	Version	Required For	Download Link
TI mmWave SDL	1.0.0.x	Diagnostic library for different device variants.	Link For access to SDL please contact your local TI sales representative to get a Safety NDA signed with TI.
TI mmWave SDK	3.5.0.x	Compilation of device application for different device variants.	TI mmWave SDK 3.5.0.x and all the related tools are required to be installed as specified in the mmWave SDK release notes
Uniflash	Latest	Quickstart Firmware	Download offline tool or use cloud version

Quickstart

The quickstart guide will cover setting up the EVM, flashing firmware, and running the demo.

1. **Setup the EVM for Flashing Mode**
   - For AWR1843: follow the instructions for Hardware Setup of xWRXXXXBOOST for Flashing Mode
   - For xWR6843ISK in Standalone/Modular Mode: Follow the instructions for Hardware Setup of xWR6843ISK/ODS for Flashing Mode

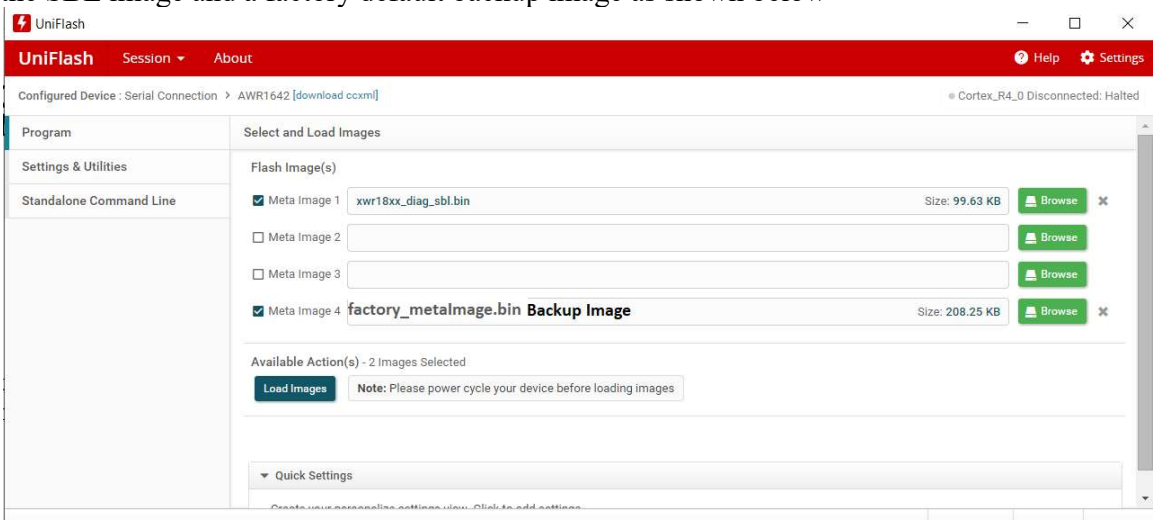
2. **Flash the EVM using Uniflash**

This reference TI design contain SBL as well as Main application, user needs to flash both type of binary files.

Flash the SBL binary (<device>_diag_sbl*.bin) associated with the EVM platform listed below using UniFlash. Follow the instructions for using UniFlash

Platform	BIN Name	Location
18xx	xwr18xx_diag_sbl.bin xwr18xx_diag_mon_demo.bin	diagnotic_monitor_ref\ti\demo\diag_mon_ref\prebuilt_binaries diagnotic_monitor_ref\ti\utils\diag_sbl\prebuilt_binaries
68xx	xwr68xx_sbl.bin xwr68xx_diag_mon_demo.bin	diagnotic_monitor_ref\ti\demo\diag_mon_ref\prebuilt_binaries diagnotic_monitor_ref\ti\utils\diag_sbl\prebuilt_binaries

1. Load the SBL image and a factory default backup image as shown below



2. Find the COM port which shows as "*XDS110 Class Application/User UART*" under device manager. That COM no. needs to be set in 'Setting & Utilities' option of UniFlash.

> **Note**: Same xwr68xx_diag_sbl.bin & xwr68xx_diag_mon.bin binary files for both of IWR6843 and AWR6843 devices.

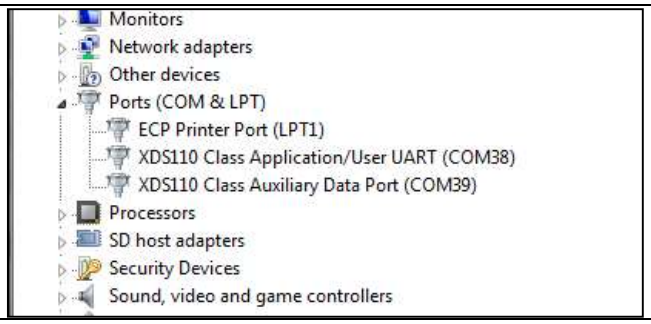
3. **Setup the EVM for Functional Mode**

- For xWR6843ISK in Standalone/Modular Mode: Follow the instructions for Hardware Setup of IWR6843ISK/ODS for Functional Mode
- For xWR1843: Follow the instructions for Hardware Setup of IWRXXXXBOOST for Functional Mode
- For MMWAVEICBOOST + Antenna Module setup: Follow the instructions for Hardware Setup of MMWAVEICBOOST + Antenna Module for Functional Mode

At this point, the EVM should be powered, connected to the PC, flashed with the demo, and put in functional mode. The hardware setup is now complete.

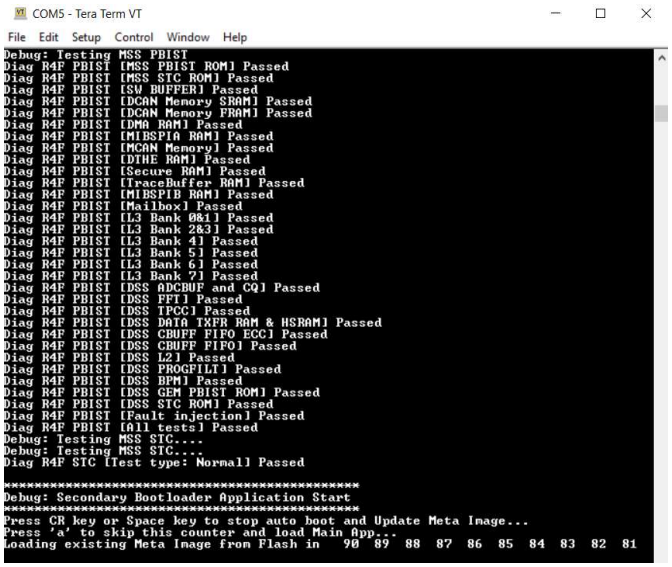
4. Execute the application

By this time SBL metaImage is already flashed to the EVM. Follow the below steps to load the main image.

- User COM port number which is enumerated as 'XDS110 Class Application/User UART' in the device Manager.	

1. Connect to the COM port found in previous step (using any serial terminal application like Teraterm, Hyperterminal etc.) and configure the port (@baudrate 115200).

2. On bootup, SBL performs PBIST and STC diagnostic test on MSS and DSS core, then proceed for main application load. It will print the following message prompting the user to press CR or SPACE to stop the autoboot process and load a new application meta image over UART.



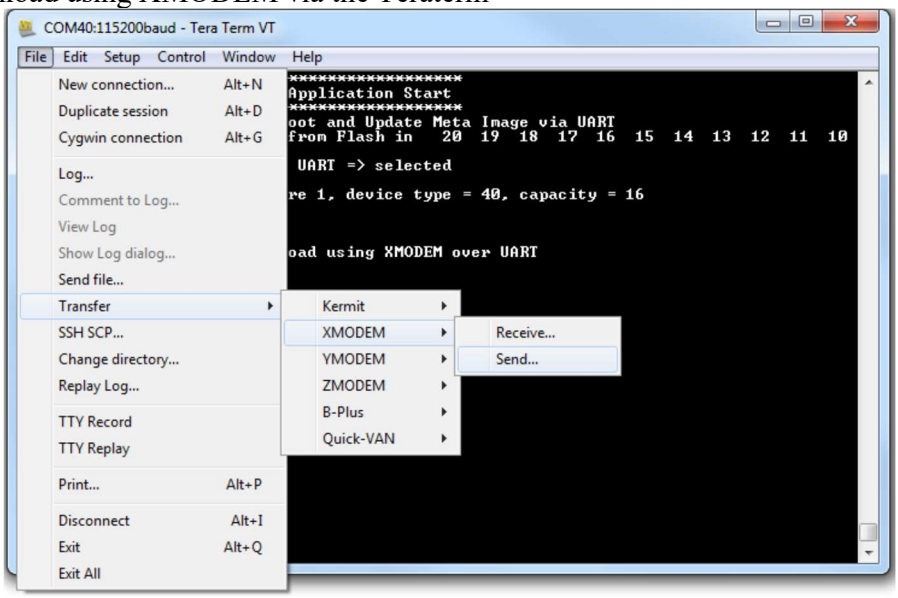
3. Press space key to stop the autoboot process. You will see the following prints. The flash at SBL_METAIMAGE_OFFSET address will be erased.

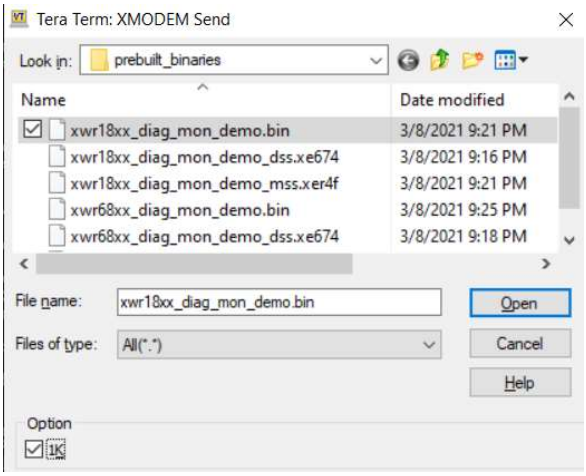
```
**********************************************
Debug: Secondary Bootloader Application Start
**********************************************
Press CR key or Space key to stop auto boot and Update Meta Image...
Press 'a' to skip this counter and load Main App...
Loading existing Meta Image from Flash in   90  89  88  87
Debug: Update Meta Image selected

qspiClk  198000000Debug: Device info: Manufacturer: 1, Device type = 40, Capacity =
16

Debug: Loading application metaImage from Flash address: c0040000
Debug: Erasing SFlash...
Debug: Flash Erase complete
Debug: Start the image download using XMODEM over UART
CCCCCC
```

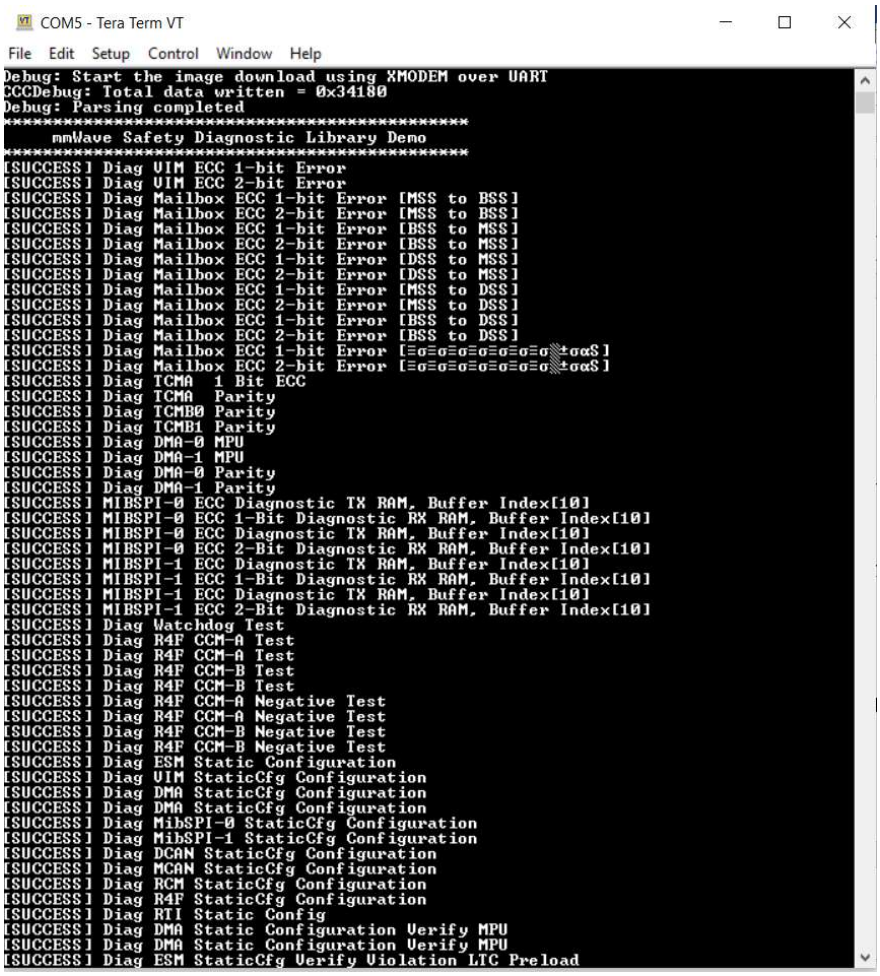
4. Start the file download using XMODEM via the Teraterm



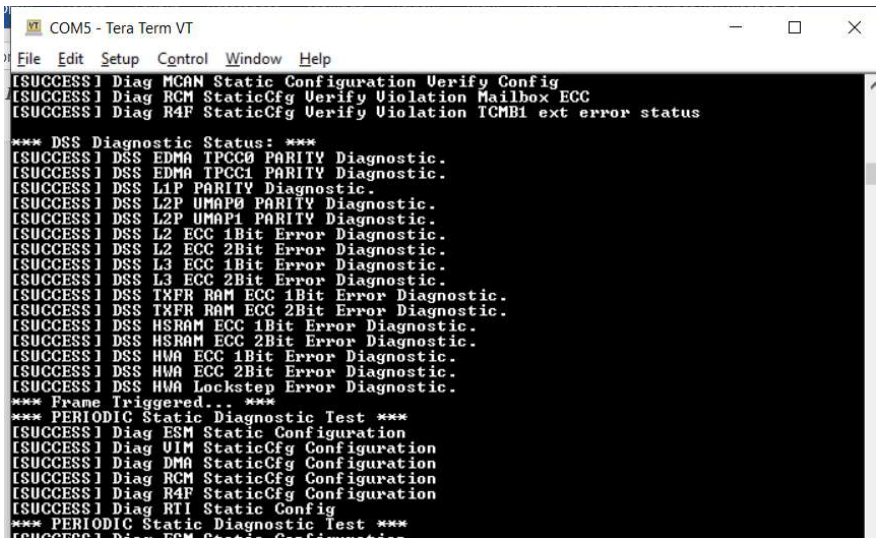


5. Once the image is downloaded, SBL verifies the image and loads from SFLASH to RAM.

Note: If the application meta image boot fails for any reason, the backup image is loaded from SFLASH to RAM. If both the images fail to load, SBL resets the board and goes back to original step.



- If main application is flashed already then user can hit ‘a’ to skip the autoboot counter and SBL will load that from sFlash and it will be executed.
- Main application will run the miscellaneous Diagnostic test (MSS/DSS) and enable the monitoring feature of the device. On the serial terminal screen, you would see status of those tests.



- After MSS and DSS boot time Diagnostic Injection test, MSS configures device for misc monitor features and print its failure state if any.
- At every FTTI interval it checks for any failure monitoring report, executes set of static diagnostic test and prints the status over UART.

Appendix

- Refer Release Notes for limitation and known issues.
- Refer Developer's Guide for in depth detail of this application.