CYTVII-C-2D-6M-327-SET and CYTVII-C-2D-6M-327-CPU

Manufacturing Test Procedure

Assembly number:	**Revision:** 1.0
Schematic number:	**Revision:** 1.0
Product: CYTVII-C-2D-6M-327-CPU and CYTVII-C-2D-6M-327-SET	
Contact person: ASWIN V	

1. Test Summary:

Product Version(s) supported: CYTVII-C-2D-6M-327-SET and CYTVII-C-2D-6M-327-CPU

Total Test Coverage: 86.67% (Details listed below)

S.No	PCBA	Total Components	Components Covered	Coverage
1	CYTVII-C-2D-6M-327-CPU	750	650	87%

Table 1 - Coverage Details

Test Time per Unit: 15 minutes

2. Documentation:

S.No	PCBA	Document	Arena Part #
1	CYTVII-C-2D-6M-327-CPU	CYTVII-C-2D-6M-327-CPU BOARD PCB LAYOUT	600-60614-01
2		CYTVII-C-2D-6M-327-CPU BOARD FABRICATION DRAWING	610-60614-01
3		CYTVII-C-2D-6M-327-CPU BOARD ASSEMBLY DRAWING	620-60614-01
4		CYTVII-C-2D-6M-327-CPU BOARD SCHEMATIC DRAWING	630-60614-01

Table 2 – Documentation Details of CPU Board

S.No	PCBA	Document	Arena Part #
1	CYTVII-C-2D-6M-PMIC	CYTVII-C-2D-6M-327-CPU-PMIC BOARD PCB LAYOUT	600-60584-01
2		CYTVII-C-2D-6M-327-CPU-PMIC BOARD FABRICATION DRAWING	610-60584-01
3		CYTVII-C-2D-6M-327-CPU PMIC BOARD ASSEMBLY DRAWING	620-60584-01
4		CYTVII-C-2D-6M-327-CPU PMIC BOARD SCHEMATIC DRAWING	630-60584-01

Table 3 – Documentation Details of PMIC Board

3. Delivery method for the documentation:

ARENA PLM System.

4. Equipment Requirements:

4.1 Kit content (Devices Under Test –DUT for Kit Rev **):

(a) CYTVII-C-2D-6M-327-CPU assembled PCB

(b) 12V Power Adapter

(c) USB Mini-B Cable

(d) Quick Start Guide Document

4.2 Hardware Requirements:

S.No	Equipment	Qty	Version	Supplied By
1	12V Power Adapter	1		Cypress
2	MiniProg4 programmer with USB-C-Type cable	1		Cypress
3	USB Mini-B cable	1		Cypress
4	Basic Digital Multimeter	1		Cypress
5	Female to Male Jumper	1		Cypress

S.No	Equipment	Qty	Version	Supplied By
6	Female to Female DB 9 Cable	1		Cypress
7	HeadPhone	1		Cypress
8	Ethernet & LIN test Jig	1		Cypress
9	Arm JTAG 20 pin connector and 10 pin connectors	1		Cypress
10	RJ45 Cable	1		Cypress
11	LVDS Display	2		Cypress

Table 4 – Hardware Requirements

4.3 Laptop/PC requirements:

The below are the minimum requirements for the PC/Laptop used for testing.

S.No	Specification	Requirement
1	Processor	2GHz or better
2	RAM	2 GB or better
3	Operating System	Win 7/ Win 10
4	Hard Drive free space	1 GB or more
5	USB port	USB3.0 or USB2.0

Table 5 – Laptop Requirements

4.4 Firmware / Software Requirement:

S.No	Software	Version	Source
1	CY Firmware for CYTVII-C-2D-6M-327-CPU	Latest from Arena	
2	Auto Flash Utility 1.2 and TVII-GUI-MTP Tool for programming the board under test	Latest from Arena	

Table 6 – Firmware Requirements

Note: For each new build make sure that the latest software and firmware is downloaded from Arena before starting the testing.

Note: For the software and firmware files downloaded from arena, verify that the checksum for the file is matching to the arena checksum.

5. One Time setup of CPU Board under Test

- Connect 2FPD Displays at J9 and J10 respectively.
- **NOTE:** If the board under test is **-SET**, kit Connect MIPI Camera to J42.
- Connect the default jumper on the board as mentioned in the **Table 7**

Jumper# on Board to test	Position
J11	1-2
R18	1-2
R20	1-2
J21	1-2
J28	1-2
J30	1-2
J32	1-2
J34	1-2
R35	1-2
J35	1-2
R36	1-2
J36	1-2
R37	1-2
J37	1-2
R38	1-2
J38	1-2
R39	1-2
R40	1-2
J40	1-2
R41	1-2
R42	1-2
R43	1-2
R44	1-2
R45	1-2
R46	1-2
R47	1-2
R48	1-2
R49	1-2
R56	1-2
R57	1-2
J71	1-2
J72	1-2
J83	1-2

Jumper# on Board to test	Position
J89	1-2
R171	1-2
R176	1-2
R190	1-2
R191	1-2
R192	1-2
R193	1-2
R194	1-2
R195	1-2
R196	1-2
R197	1-2
R200	1-2
R201	1-2
R202	1-2
R203	1-2
R204	1-2
R205	1-2
R206	1-2
R207	1-2
R208	1-2
R199	1-2
R243	1-2
R293	1-2
R388	1-2
R392	1-2
R395	1-2
R397	1-2
R580	1-2
R581	1-2
R641	1-2
R642	1-2
R644	1-2
R657	1-2
R658	1-2
R659	1-2
R660	1-2
R661	1-2
R662	1-2
R672	1-2
R677	1-2
R678	1-2
R714	1-2
R715	1-2
R736	1-2
R82	1-2
R83	1-2
R109	1-2
R111	1-2
R127	1-2
R128	1-2
R134	1-2

Jumper# on Board to test	Position
R135	1-2
R136	1-2
R613	1-2
R614	1-2
R620	1-2
R621	1-2
R622	1-2
J116	1-2
J117	1-2
J118	1-2
J119	1-2
J120	1-2
J121	1-2
J122	1-2
J123	1-2
J124	1-2
J125	1-2
J126	1-2
J127	1-2
J128	1-2
J129	1-2
J130	1-2
J131	1-2
J132	1-2
J133	1-2
J134	1-2
J135	1-2
J136	1-2
J137	1-2
J138	1-2
J139	1-2
J3	2-3
J4	2-3
J5	2-3
J6	2-3
J16	2-3
J18	1-2
J19	2-3
J23	1-2
J26	2-3
J27	1-2
J29	1-2
J33	1-2
J52	2-3
J63	1-2
J74	2-3
J75	2-3
J84	2-3
J88	2-3
J114	2-3
J43	1-2

Jumper# on Board to test	Position
J47	1-2

Table 7 – Jumper settings on CYTVII-C-2D-6M-327 Board under test

Powering the test Setup

- Connect the 12V power adapter at J12 on the CPU board under test (DUT) and the other end to the mains supply. Refer to Figure 1

Figure 1 – Power Supply Connector J12 on CPU Board under Test

- Turn on the switch SW1 on the CPU board. The power LED1, LED2, LED3 and LED4 turns ON indicating the 1.1V, 1.8V, 3.3V and 5V is getting generated. Refer to Figure 1
- Connect the Type-B Mini USB cable at J48, on the CPU board under test (DUT). Connect the other end of the cable to a PC. Refer to Figure 2.

Figure 2 – USB Connector J48 on CPU Board under Test

Testing the Power supply

- Once the board is powered ON check for the below LED indications.

S.No	LED on Board under test	Status
1	LED4	ON
2	LED3	ON

3	LED2	ON
4	LED1	ON

Table 8 – LED Status

- Measure the voltage between the following points.

S.No	Measurement on test point	Expected Voltage
1	TP10 and TP6 (GND)	12.0V +/-10%
2	TP2 and TP6 (GND)	5.0V +/-10%
3	TP32 and TP6 (GND)	3.3V +/-10%
4	TP1 and TP6 (GND)	1.8V +/-10%
5	TP25 and TP6 (GND)	1.1V +/-10%
8	TP38 and TP6 (GND)	1.8V +/-10%
9	TP169 and TP6 (GND)	1.5V +/-10%
10	TP170 and TP6 (GND)	2.8V +/-10%

Table 9 - Voltage levels

6. One Time Setup:

Perform the following steps.

- Download and extract the SW Zip file.
- Install TVII_MTP-1.4-amd64.msi (Ignore if already installed).
- Click Next for the following prompts and wait until installation gets completed. Now press Finish button.
- Copy the MTP_Py_Config.txt file and replace the file in C:\Program Files\TVII_MTP.
- Install AutoFlashUtil_1.2.0.1469.exe (ignore if already done).
- Download and extract the FW.zip file. You can find 3 folder 1. LED-CPU, 2. MIPI-SET, 3. TVII-C-2D-6M.

- Copy the “TVII-C-2D-6M” folder to “C:\MTP_SREC_FILES”.
- If you are testing -CPU boards, copy and replace the 2 files inside LED_CPU folder to “C:\MTP_SREC_FILES\TVII-C-2D-6M\6M-327\Shipping_FW”
- If you are testing -SET boards, copy and replace the 2 files inside MIPI-SET folder to “C:\MTP_SREC_FILES\TVII-C-2D-6M\6M-327\Shipping_FW”
- Extract Lifecycle_6M_B1.zip, and go inside the folder one level and Copy the “Lifecycle_B1” folder to “C:\”.
- Create a folder named “Test_Reports” in “C:\”. (Ignore if already done)

Top level Flow Chart:

The testing of CYTVII-C-2D-6M-327-CPU will be carried out in the following steps-

Step 1 – Cortex Debug, Reset Controller and UART Transmit Test:

- The peri-test firmware is flashed using the Cortex Debug port which tests the cortex Debug port(J14).
- The Reset controller is tested by pressing the Reset button (SW2)
- UART test comes as default as we see the messages in the serial monitor.

Step 2 – User Buttons Test

- The user push buttons are tested in this step.

Step 3 – POT Test

- The POT is tested in this step.

Step 4 – User LEDs Test

- The user LEDs is tested in this step.

Step 5 – TDM Sound Test

- The 3.5mm headphone jack and Audio Codec is tested in this step

Step 6 – Octal Flash Test

- The Octal flash on the CPU board is tested in this step.

Step 7 – Hyper Ram Test

- The Hyper Ram on the CPU board is tested in this step.

Step 8 – CAN Test

- The CAN ports are tested in this step

Step 9 – LIN Test

- The LIN ports are tested in this step

Step 10 – FPD-LINK Test:

- FPD-LINK connectors are tested in this step

Step 11 – Ethernet Test

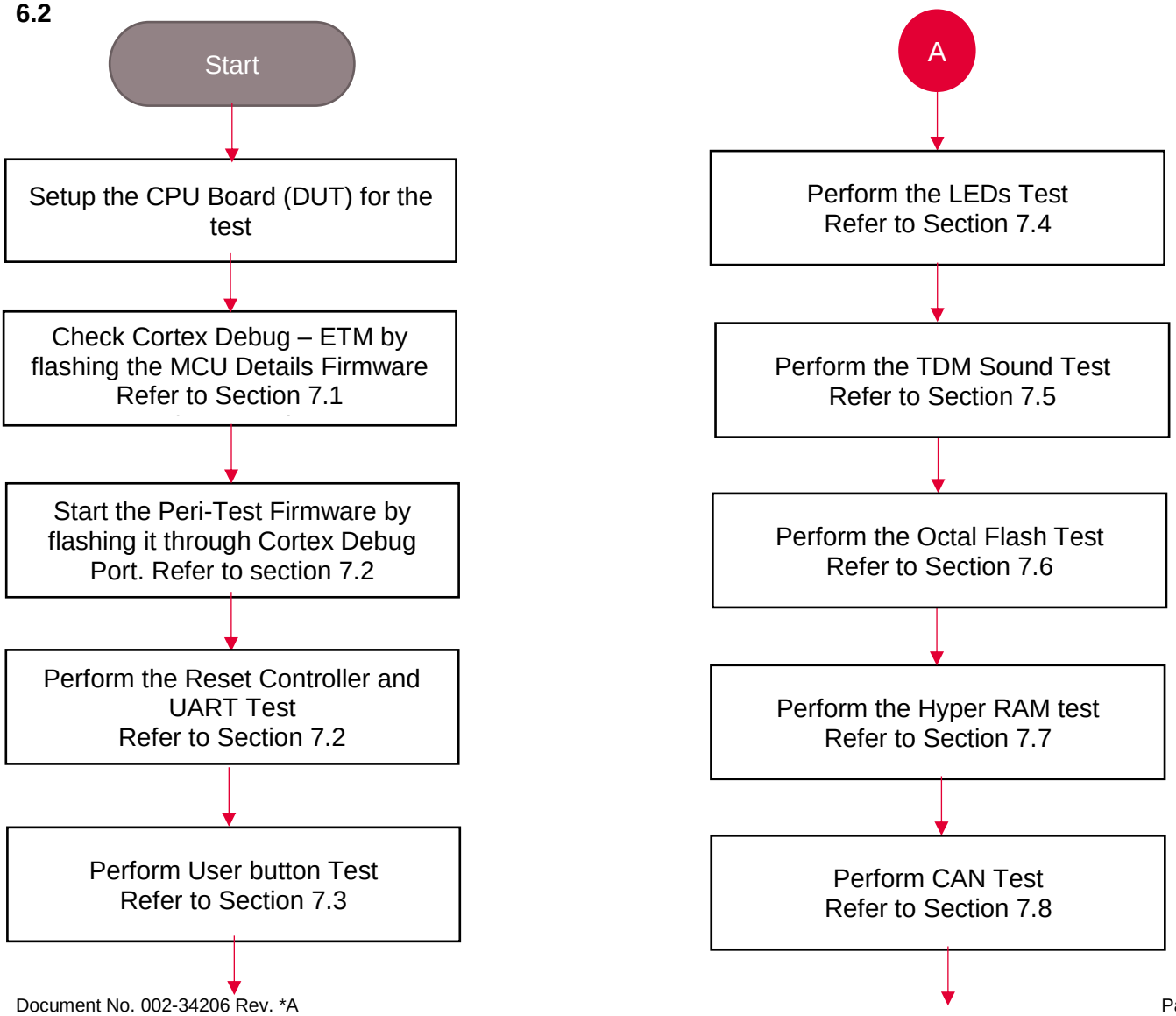
- The Gigabit Ethernet is tested in this step

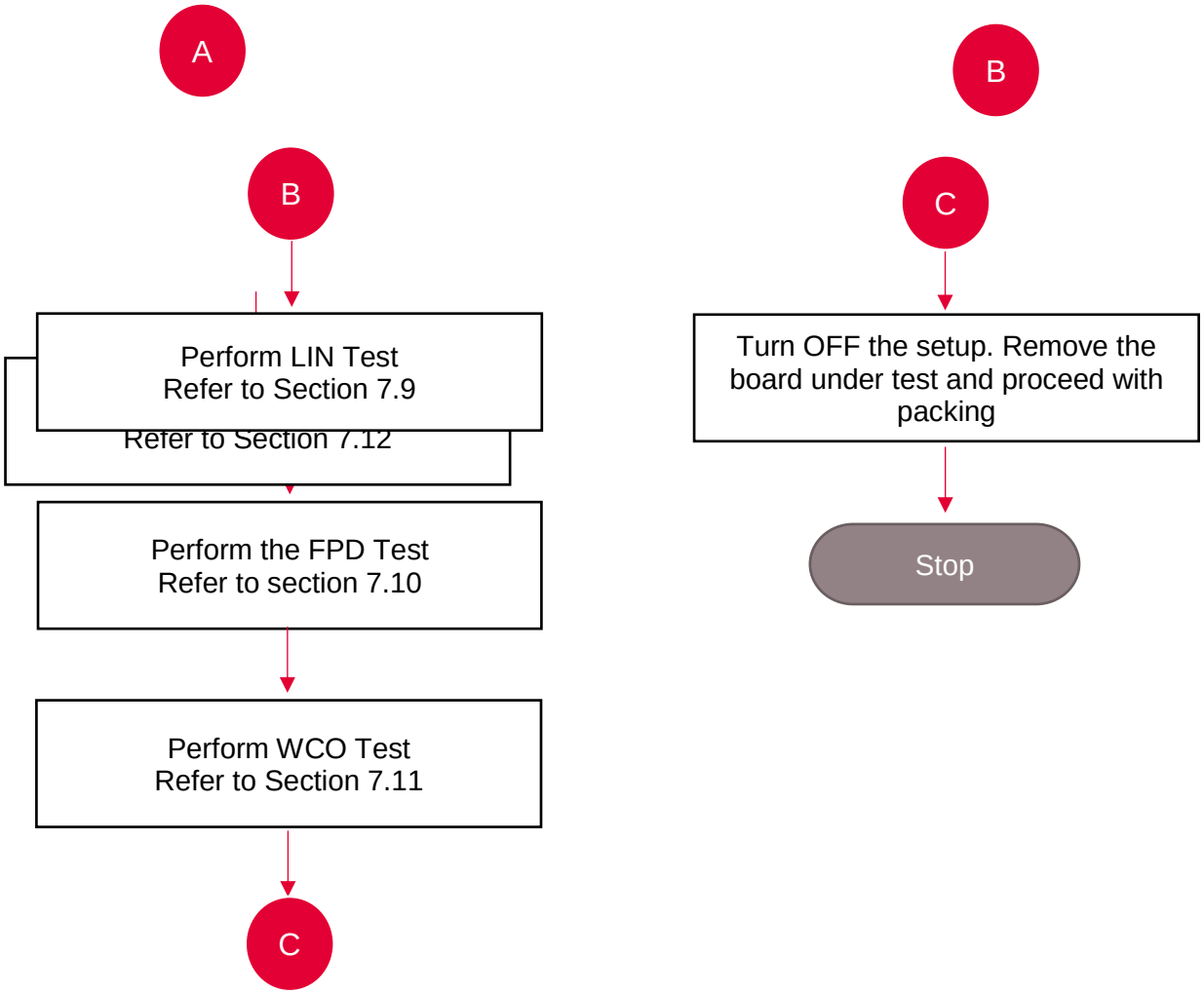
Step 12 – WCO Test

- Watch Crystal Oscillator is tested in this step.

6.1 FLOW CHART for Step 1 to Step 10

6.2





7. Device Lifecycle Conversion

- Connect MiniProg4 10-Pin cable to J14 on DUT
- Go inside Lifecycle_B1 folder.
- Click the “VirginToNormal.bat” which is in the scripts folder.
- Wait for some time and after the end of Lifecycle conversion.
- Once the terminal closes, open “C:\Lifecycle_B1\DAP\openocd\scripts\Reports\6M_B1\Regression_001\CFG_23_AVEN\Helper\BasicTest_4.txt” file.
- Go to the end of the file and check whether “****Part is in NORMAL Protection State****” is there or not.

```
3023    lifeCycleStage = 7
3024
3025    ****Part is in NORMAL Protection State****
3026
3027
3028
3029    ****Part is in NORMAL_PROVISIONED Lifecycle State****
3030
3031    0x00003e00
3032    IOR (0x 17002000, 0x 00003e00) n.e.d.
3033    IOW (0x 28001000, 0x deadbeef)
```

TEST SEQUENCE

- Go to C:\Program Files\TVII_MTP\
- Open MTP_GUI.exe file

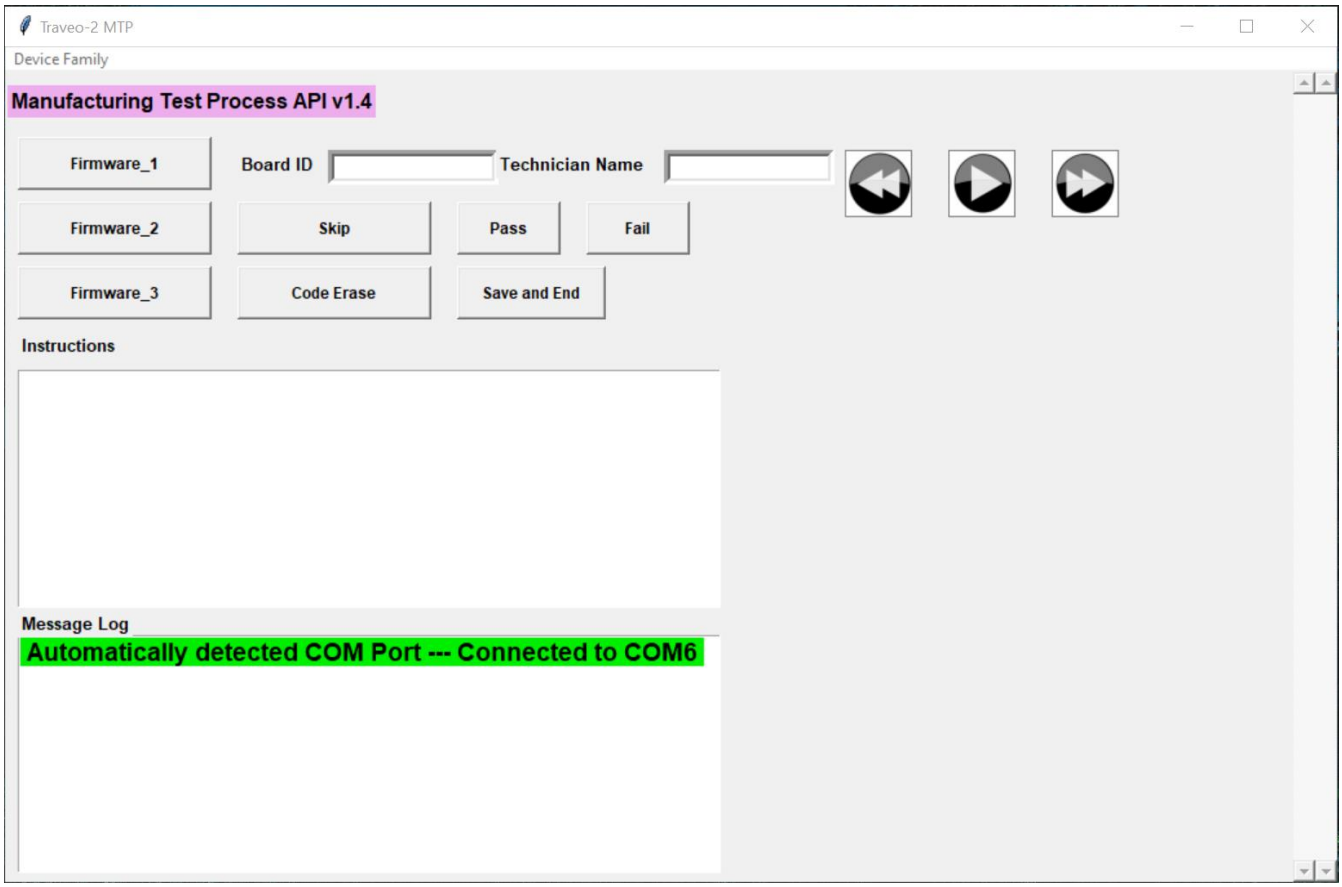


Figure 3 – MTP_GUI Window

- The window looks like as shown in Figure 3

- Now click on “Device Family” Menu on GUI and select CYTVII-C-2D-6M -> 6M-327. Refer to Figure 4.

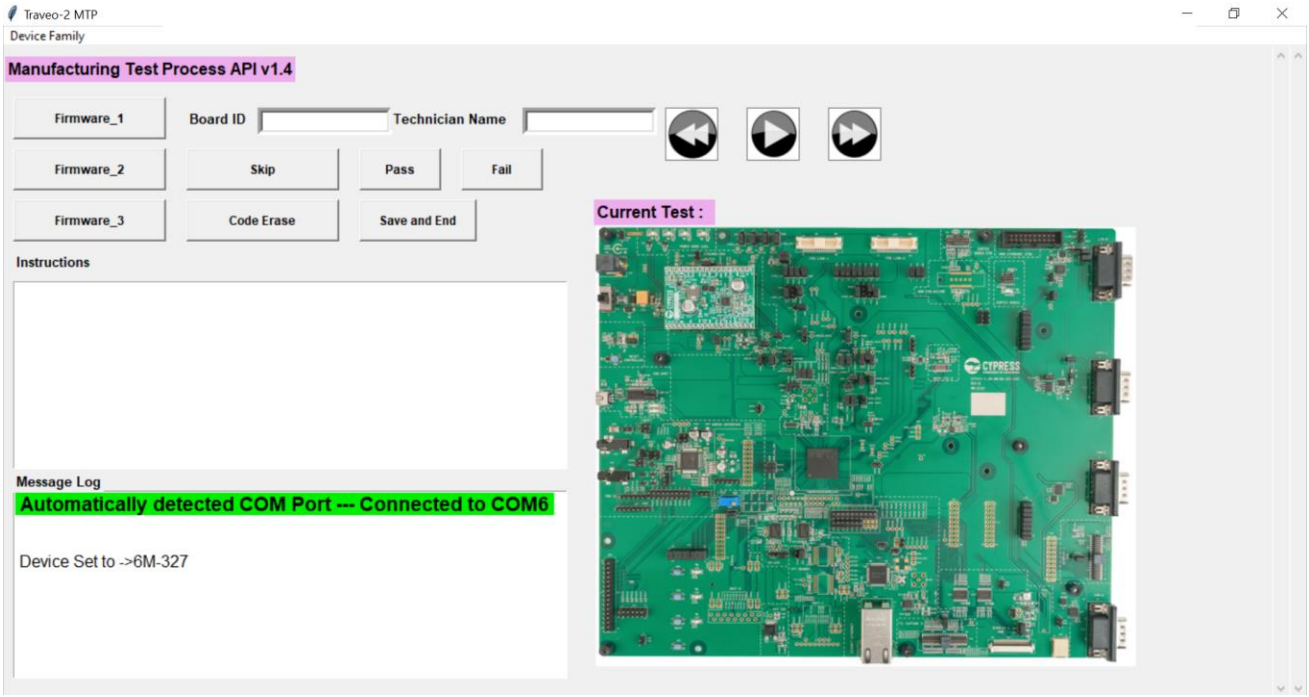


Figure 4 – Device selection menu

7.1 Starting the MCU Status Test and Flashing a code with CORTEX DEBUG

- Turn on the board and connect the Miniprog4 using the 10-Pin cable to Cortex Debug (J14)
- Click on “Firmware1” Button on the GUI and wait till the device gets flashed successfully. Remove 10 pin cable from the board and press SW2 (Reset button)
- Once the MCU Status firmware is flashed successfully a success message will be displayed as shown in the Figure-5 and all the details of MCU will be displayed in the message log as shown in the Figure-6
- Ensure the message “SILICON IS IN NORMAL STATE” is shown in the message log

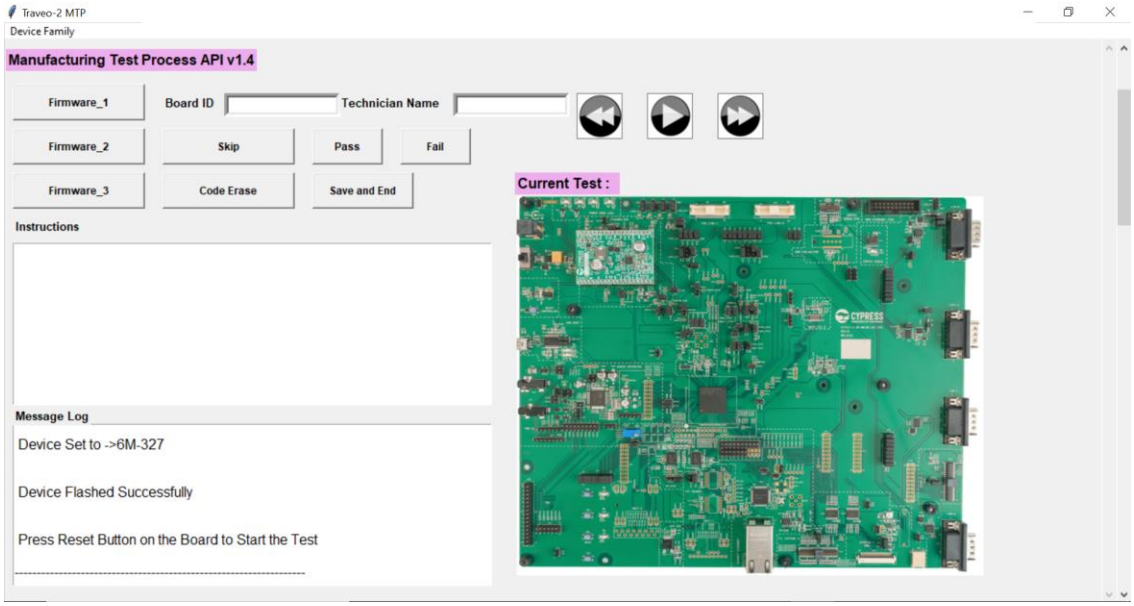


Figure 5 - Success output

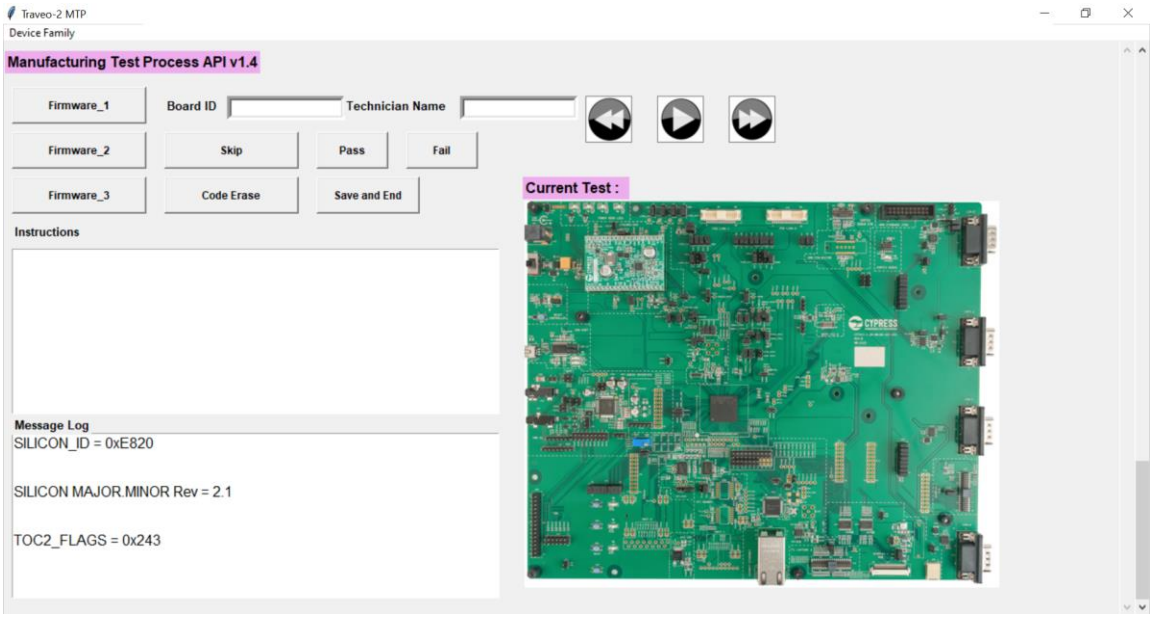


Figure 6 – MCU Details

7.2 Starting Peri-Test

- Now connect the MiniProg4 using 20-pin cable at the J8 connector.
- Click the “Firmware2” Button.
- Now the Test firmware is flashed successfully.

- Verify the download success confirmation message in the message log window as shown in the previous step i.e. as shown previously in the Figure-5
- Once the confirmation message is received, remove the MiniProg4's 20-pin cable from the CPU board and press the Reset button SW2 on the DUT as shown in Figure-7.

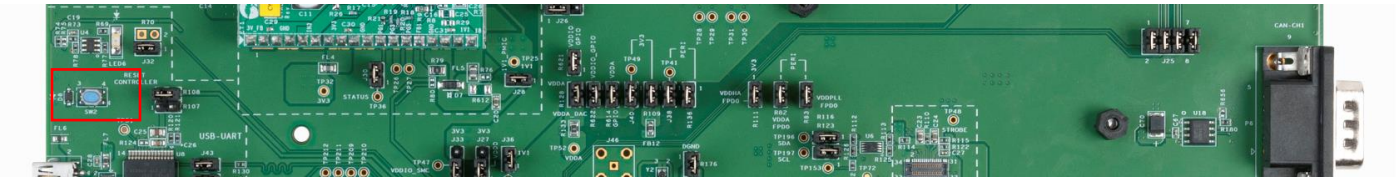


Figure 7– Reset Button

- On pressing the Reset button, the Message Log window on the GUI, displays the message as in Figure-8.

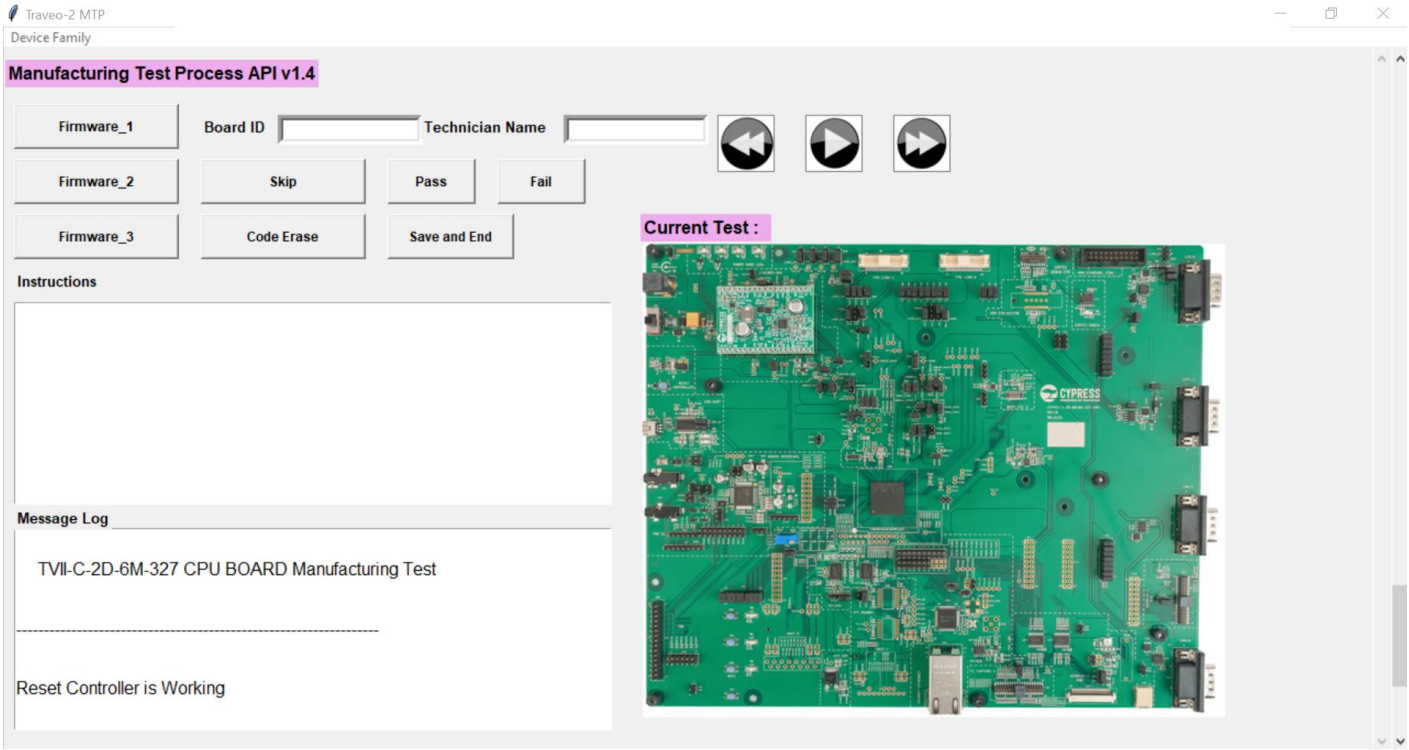


Figure 8– Start of Test firmware

- This indicates the start of peri-test firmware.
- Also, this part ensures the proper working of the reset controller also the message "Reset Controller is Working".

- The UART controller Transmit is verified as all the messages are displayed on the serial terminal.
- Press the Forward button to the see the next test.
- **Read the instruction from the Instructions log window and do the necessary changes on the Board before starting the next test.**
- Press the Play button to start the next test.

7.3 User Button Test

- Start the Button test and press SW7, SW3, SW5, SW6 in the same order, the output comes as shown in Figure-9.

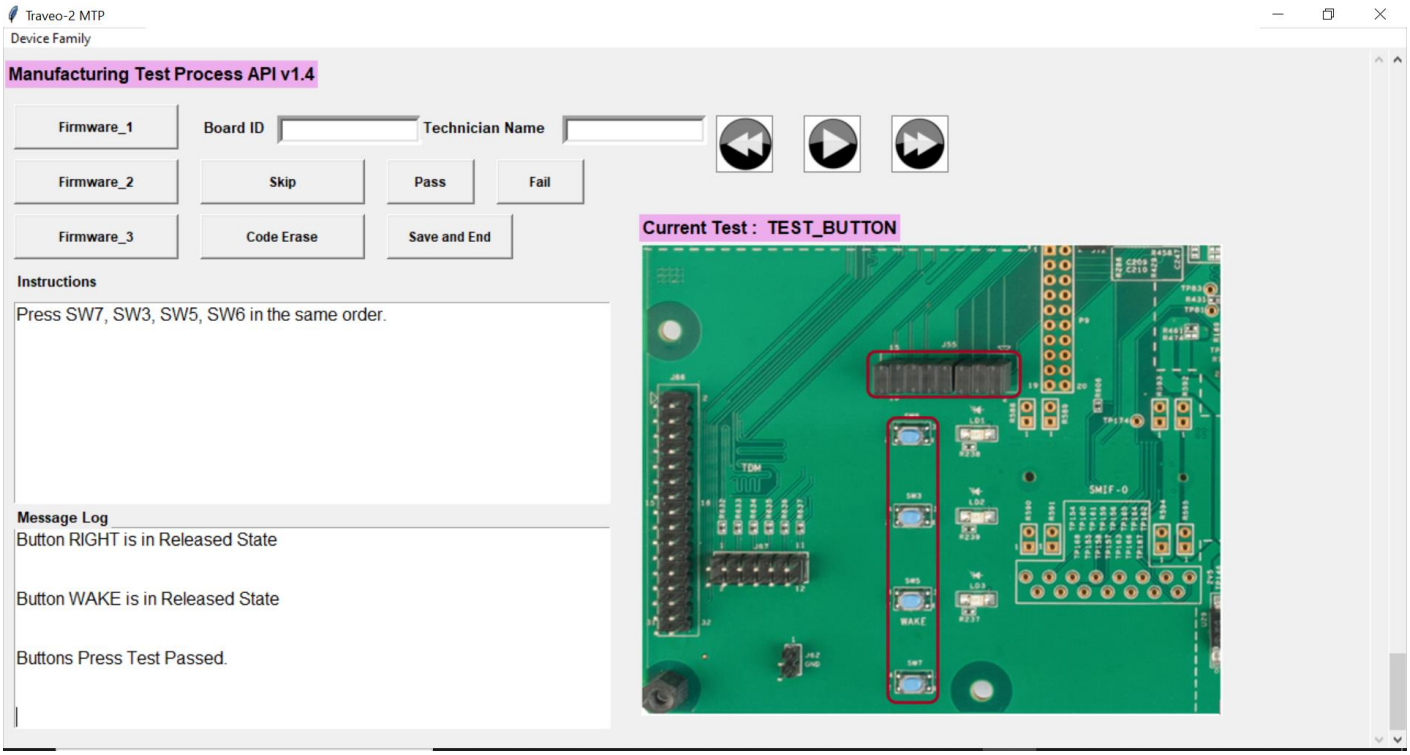


Figure 9 – Button Test Pass Window

7.4 User LEDs Test

- Click on the next button to proceed to next test and click on the play button to start the test.
- As soon as the Led test is started, the LD1, LD2 and LD3 on the CPU board blinks for 2-3 seconds.
- If the LD1, LD2 and LD3 on the CPU board blinked, then press Pass button on the GUI to indicate the test is successful and if the LD1, LD2, LD3 didn't blink, then press the Fail button on GUI to indicate the test failed.

- Press the Forward button to the see the next test.
- Read the instruction from the Instructions log window for the next test and do the necessary changes on the Board.
- Press the Play button to start the next test.

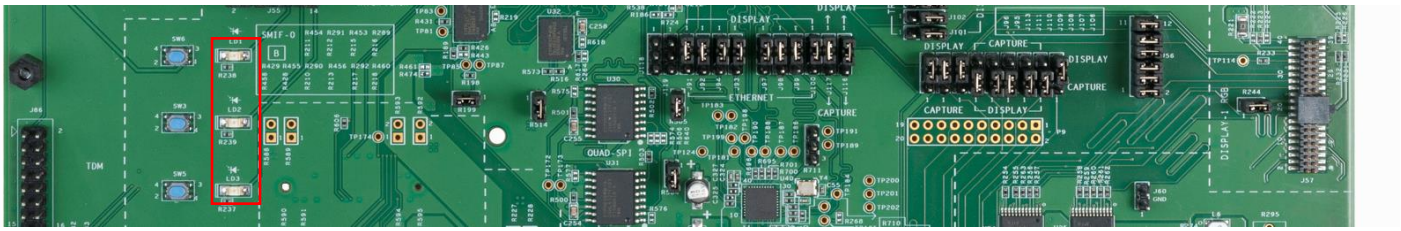


Figure 10– User LEDs

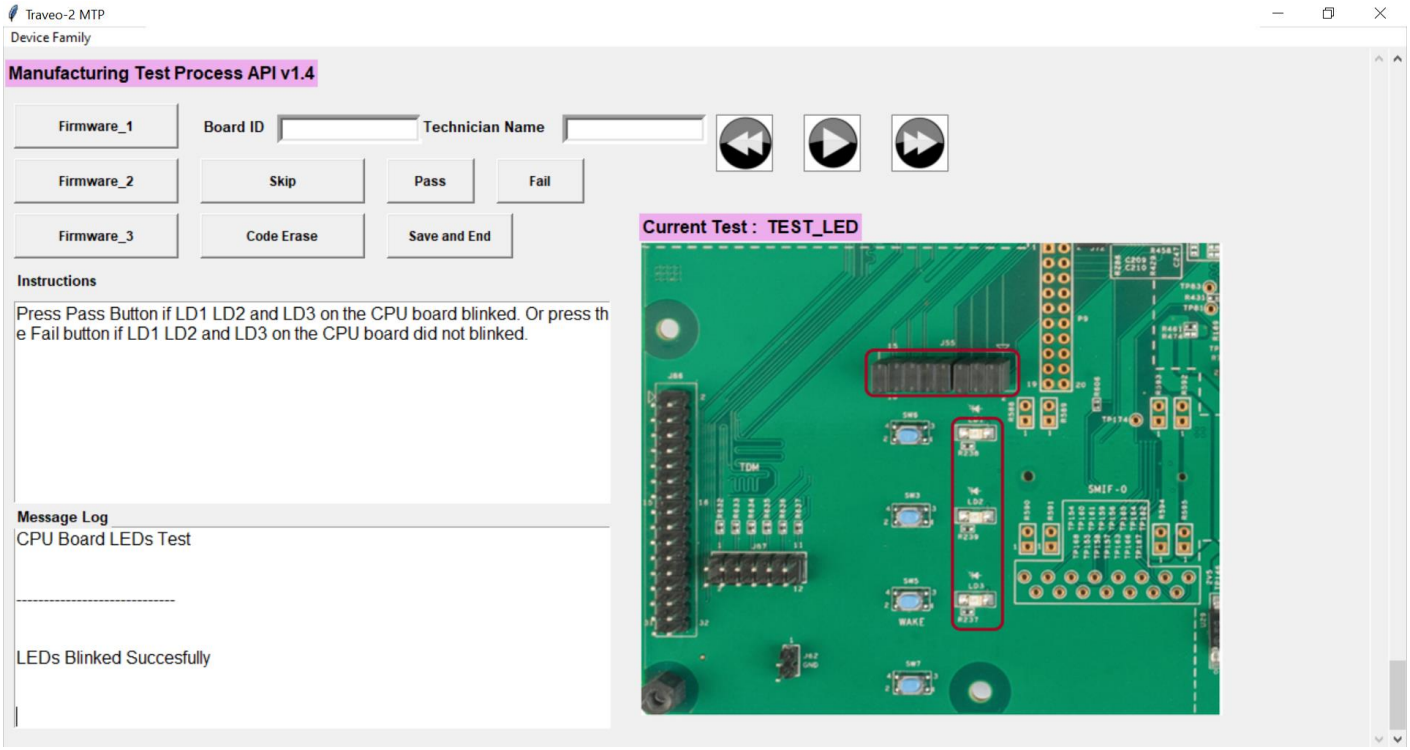


Figure 11 - End of LED Test

7.5 Potentiometer Test

- Now turn the Pot VR2 to its extreme right (clockwise) and extreme left (anticlockwise). If the pot is okay, then a message will be displayed as shown in the Figure-12

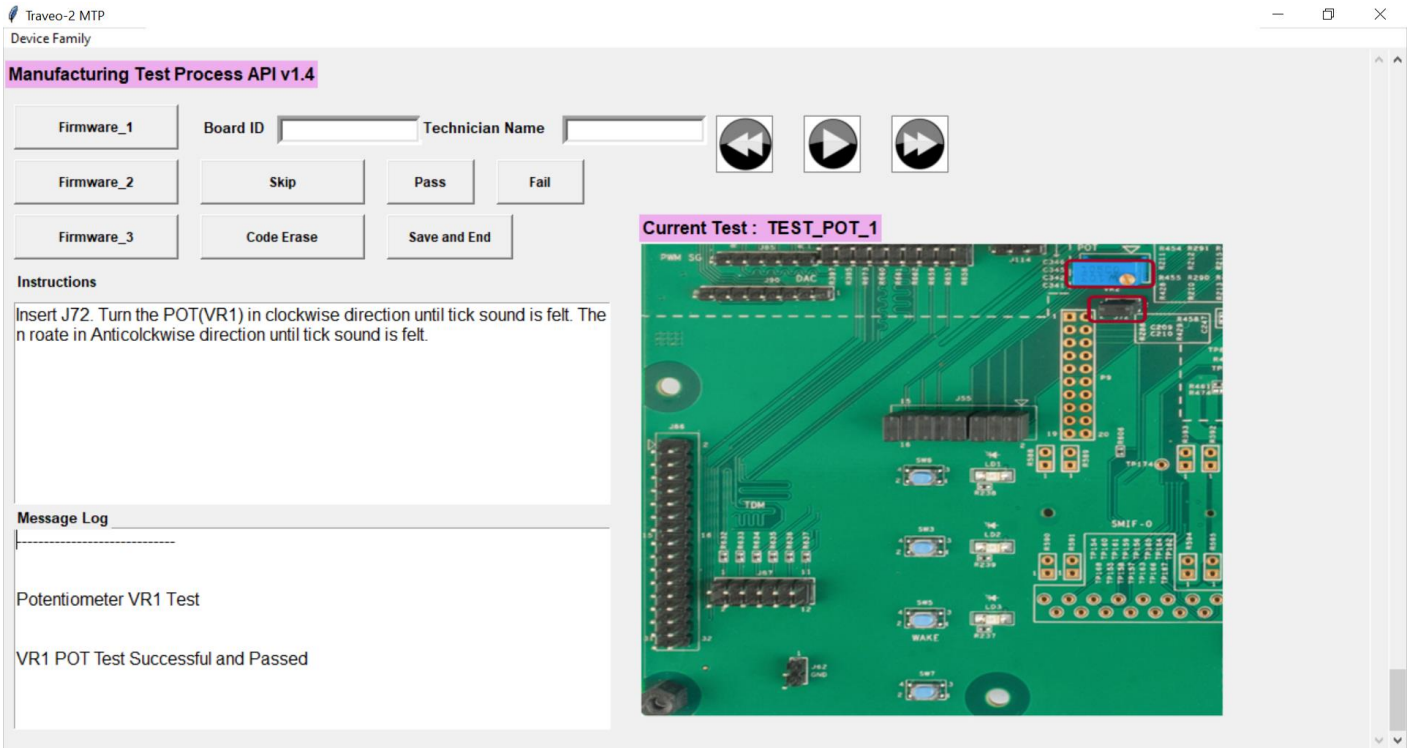


Figure 12- Pot Test

7.6 TDM Sound Test

- Connect the Jumpers (R641-1 + R642-2) and (R641-2 + R642-1) if you are using CTIA headphones (Android mobile Headphones). For CY Provided Headphone, connect R641(1-2) and R642(1-2).
- Connect the headphones to the 3.5mm headphone jack (J53).
- Click on the next button and click on the play button to start the TDM test.
- Once you hear continuous beep sound then push Pass button on the GUI to indicate TDM Sound test is successful and if the sound is not heard then push Fail button to indicate the TDM sound test is failed. Remove the headphone after completion of the test.

Figure13– TDM Earphone Jack

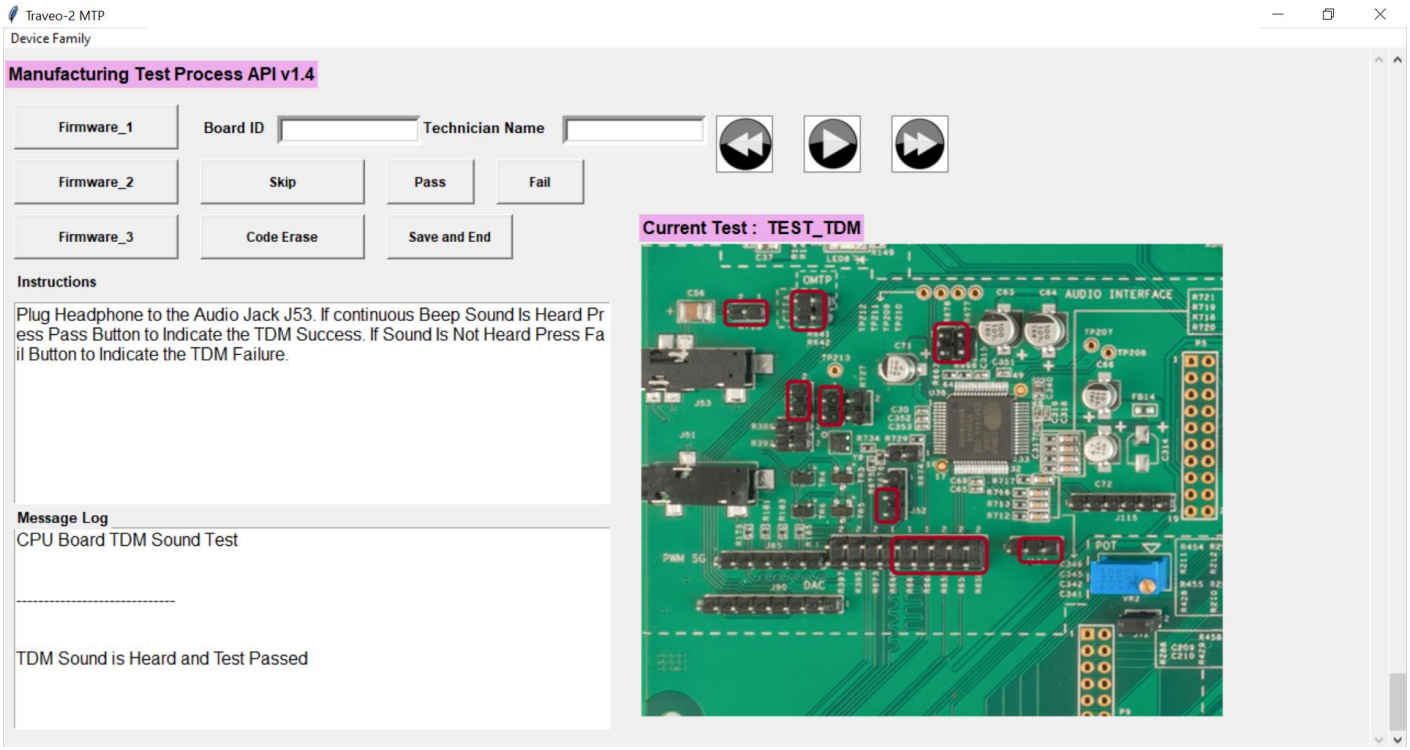


Figure 14 – End of the TDM Test

7.7 Octal Flash Test

- Ensure the jumper R199 is connected. Click the next button and click on the play button on GUI to start the test.
- Data is written and read from the Octal Flash and message log will be displayed as show in the Figure-16

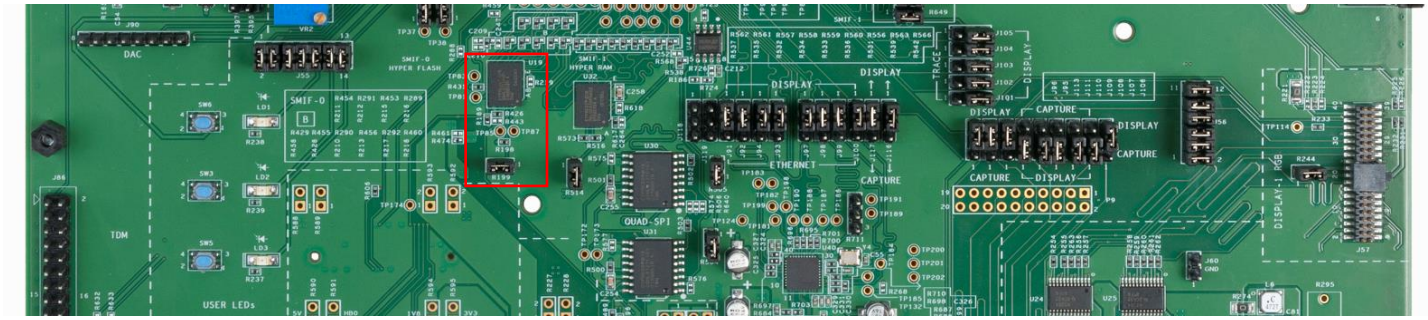


Figure15– Octal Flash Jumper

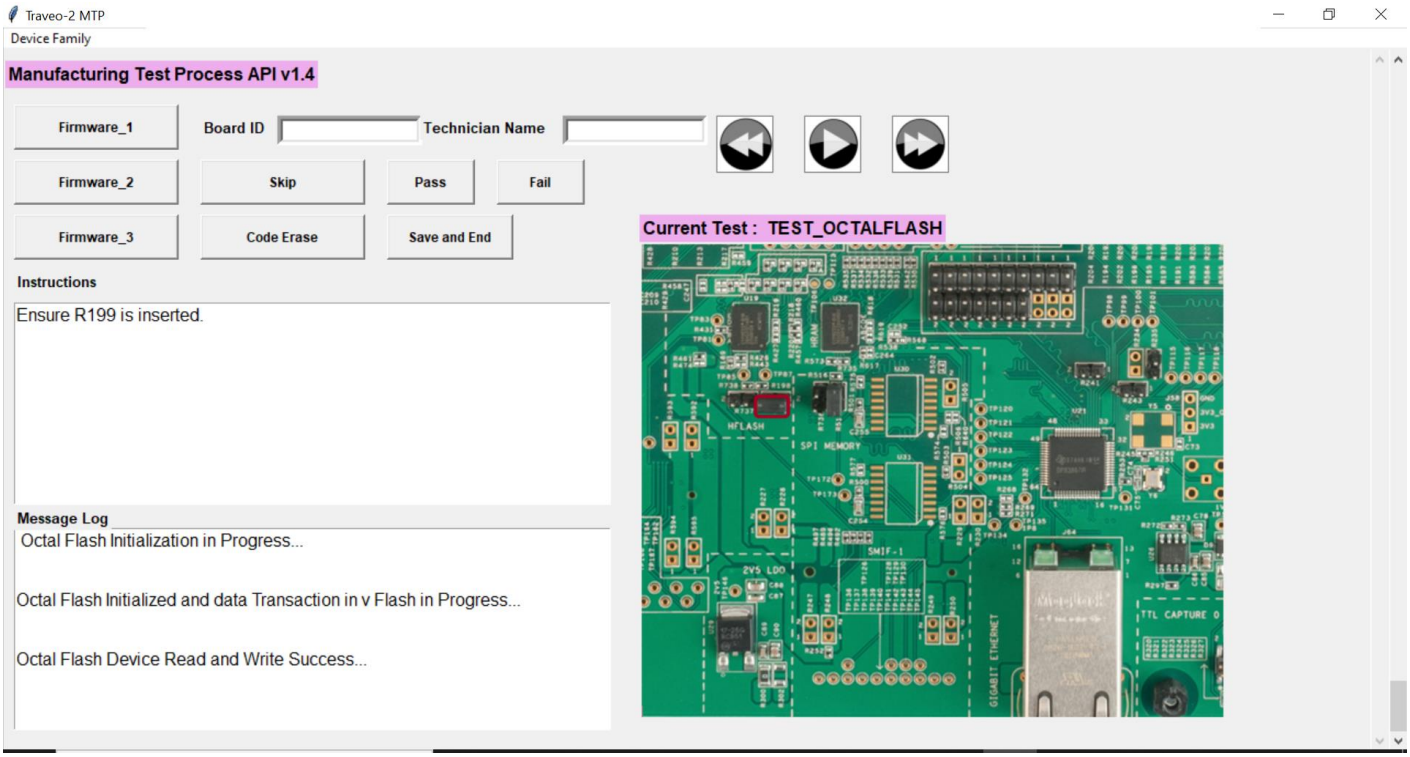


Figure 16 – Octal Flash test

7.8 Hyper Ram Test

- Ensure the jumper R736 is connected and R514 is open. Click the next button and click on the Play button on GUI to start the test.
- Data is written and read from the hyper ram as shown in the Figure-18

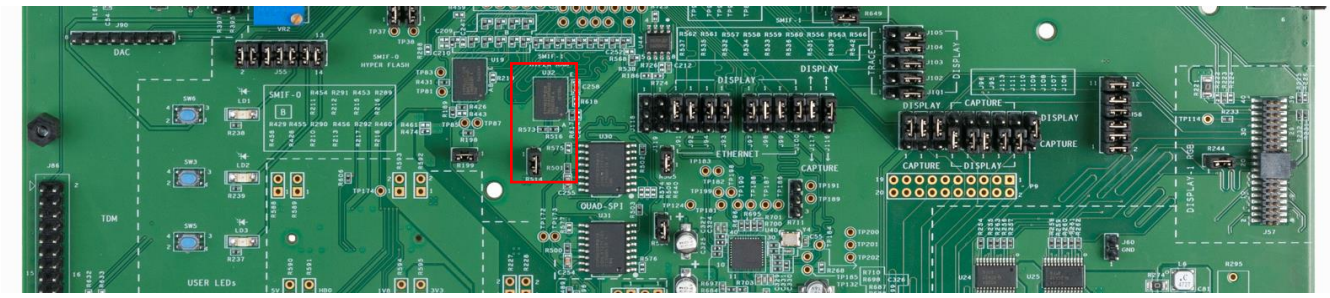


Figure17 – Hyper Ram Jumpers

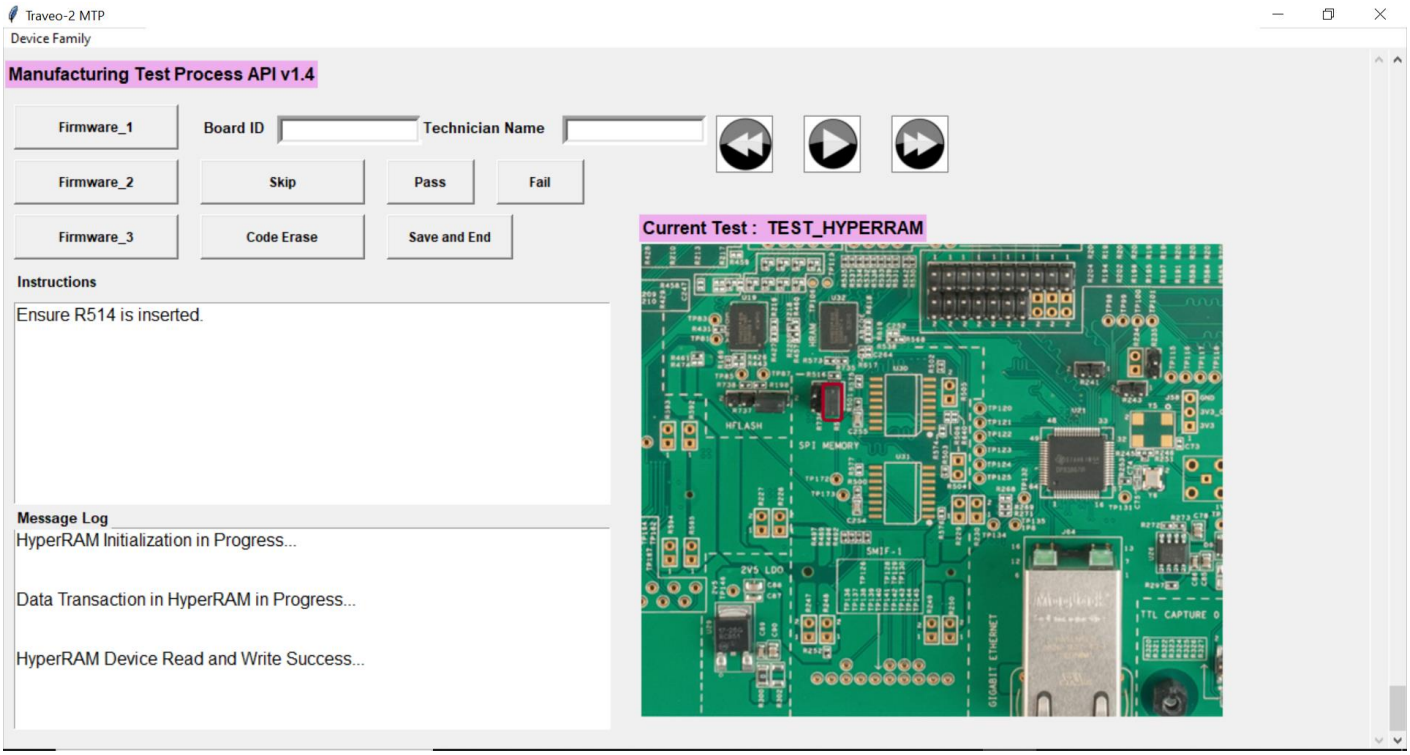


Figure 18 –Hyper Ram test

7.9 CAN Test

- Connect the DB9 cable between the CAN0 (P11) and CAN1 (P6) channel.
- Click the next button to proceed to CAN test and click on the play button on the GUI to start the test
- Then the data will be transferred between CAN0 and CAN1 channel and then the message log will be displayed as shown in the Figure-19

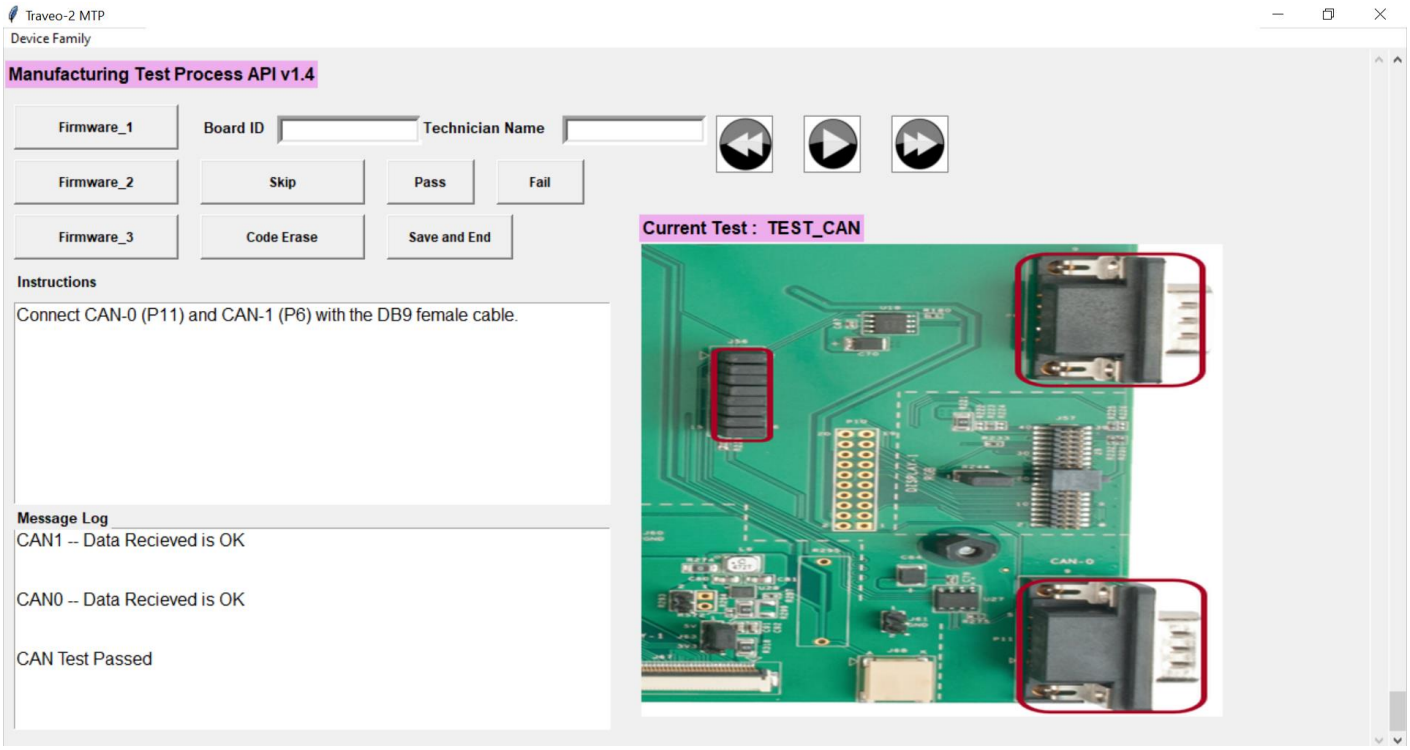


Figure19– CAN Test

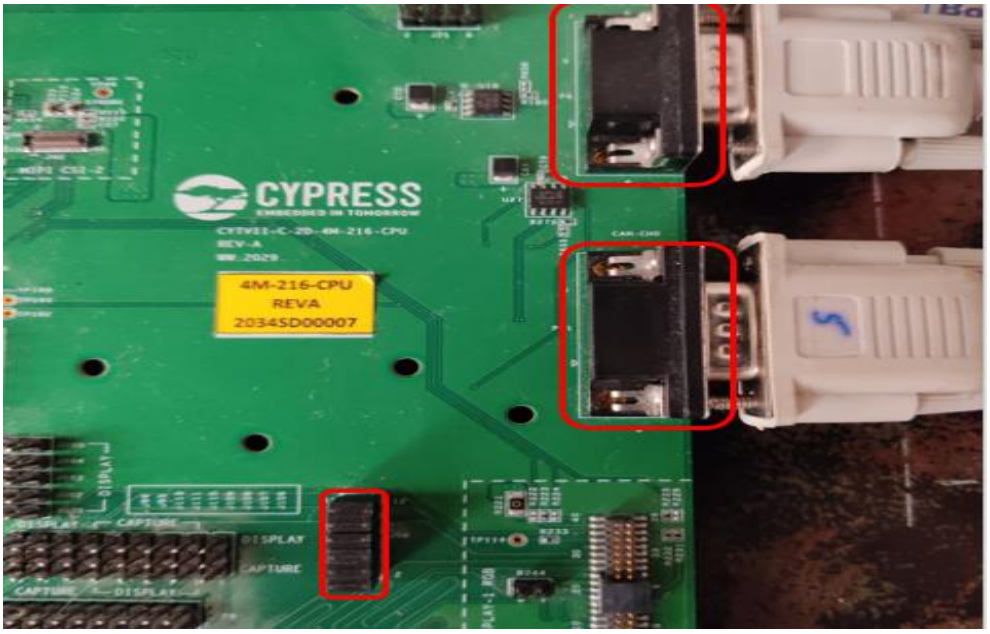


Figure 20 – CAN Channels

7.10 LIN Test

- Connect LIN-0 (P1) on DUT and LIN-0 (P1) on test jig board with the DB9 female cable.
- Click on the next button to proceed to the LIN test and click on play button to start the LIN test
- Data is transferred between the LIN0(DUT) and LIN0(Test Jig) and message is displayed on the message log as shown in the Figure-21.

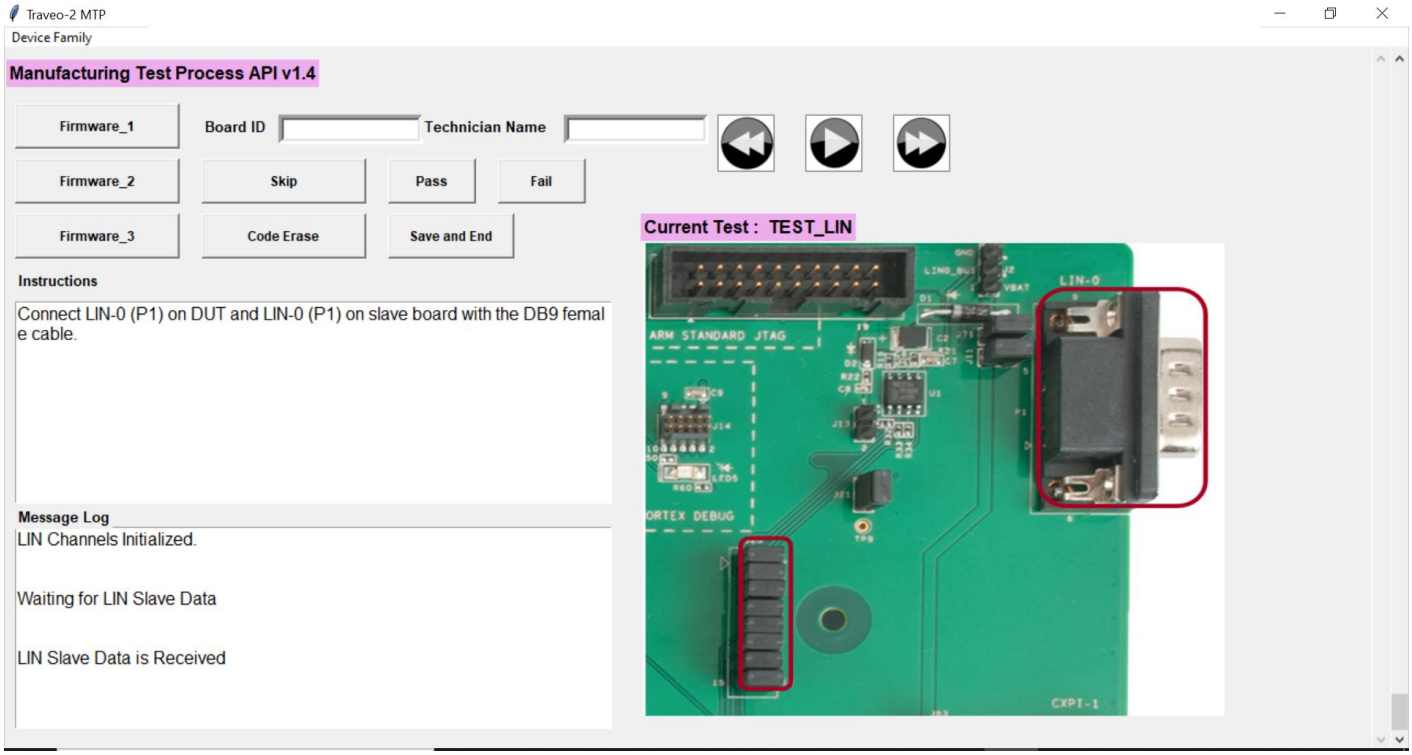


Figure 21 – LIN Test

7.11 FPD Test

- All the jumpers and FPD Display are connected by default.
- Click on the next button to proceed to the FPD test and click on play button to start the FPD test
- Press PASS if you see the IRIS patter on both the displays, else press FAIL if the IRIS pattern is not displayed.

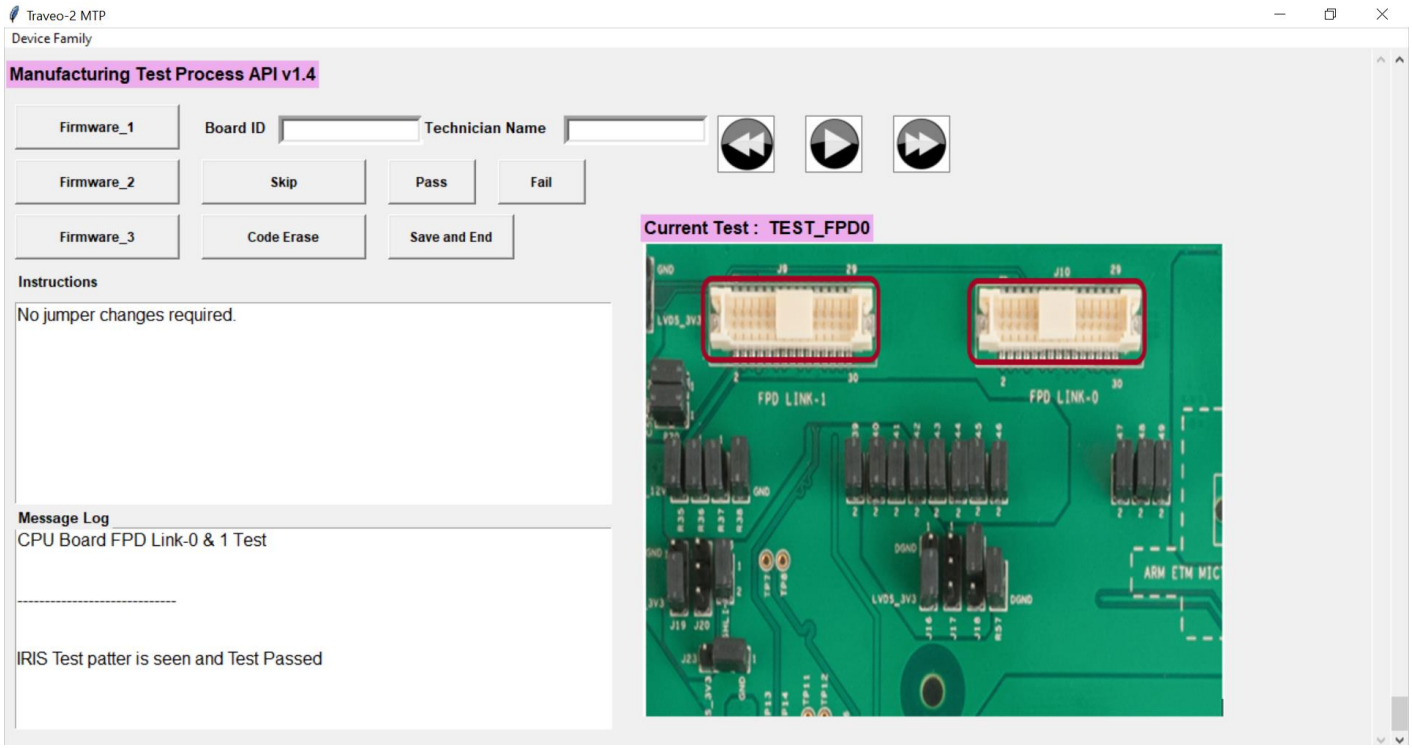


Figure 23 – FPD Test Pass Window

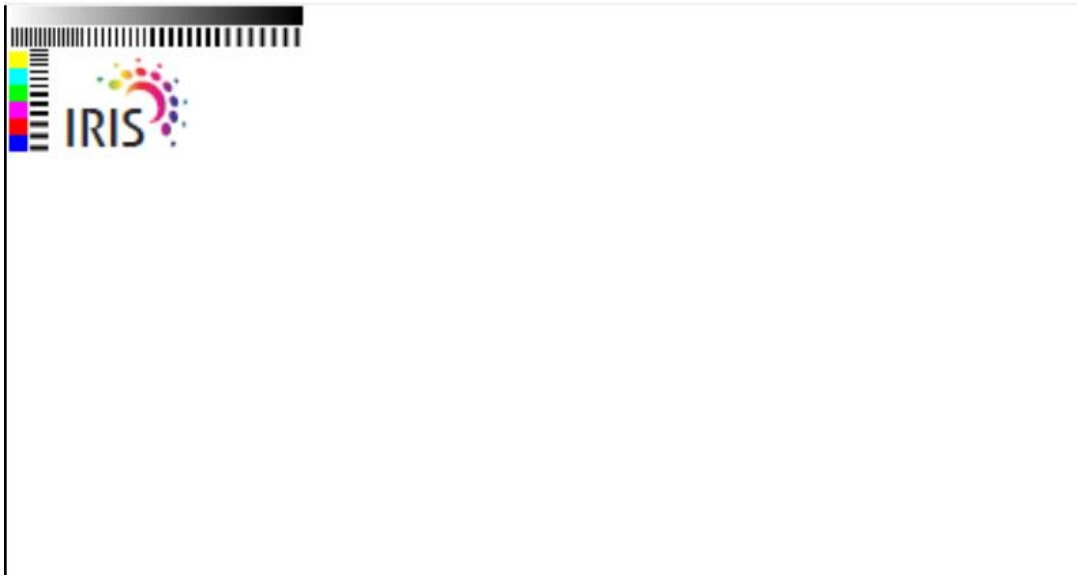


Figure 24 –IRIS Pattern

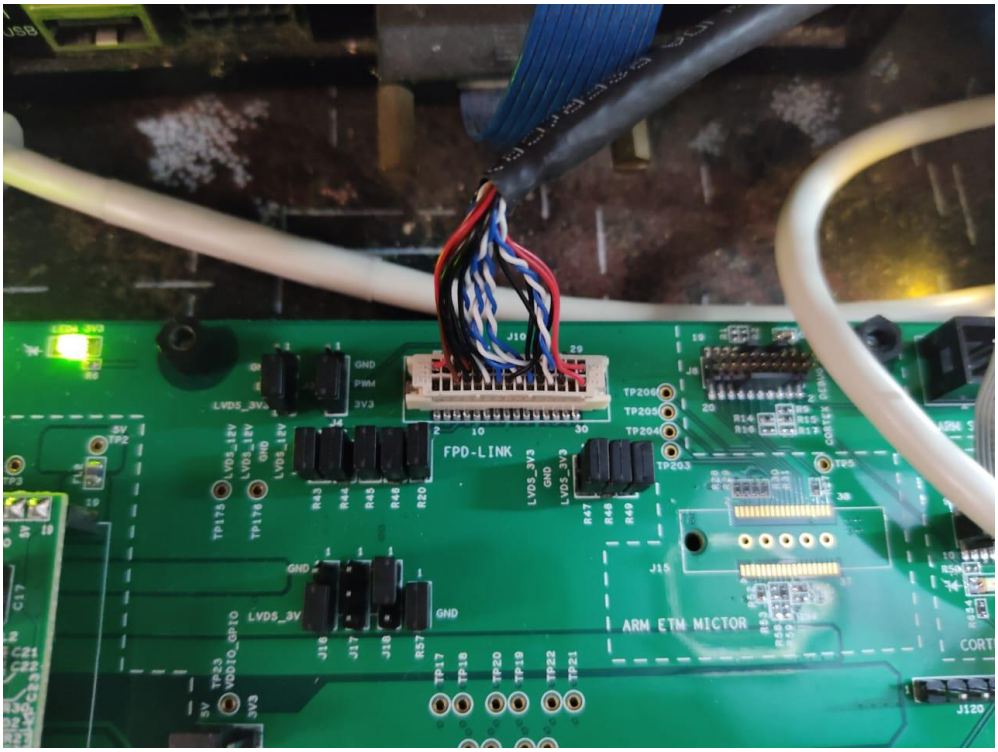


Figure 25 – FPD Connector

7.12 Gigabit Ethernet Test

- To perform Gigabit ethernet test you need to connect to gigabit ethernet test jig board.
- Connect RJ45 cable to J64 and connect other end of RJ45 to Slave board's J64, click the next button and start the test by pressing the play button on the GUI tool.
- Once the ethernet data frame is received successfully a success message will be shown on the message log window as per Figure-26.

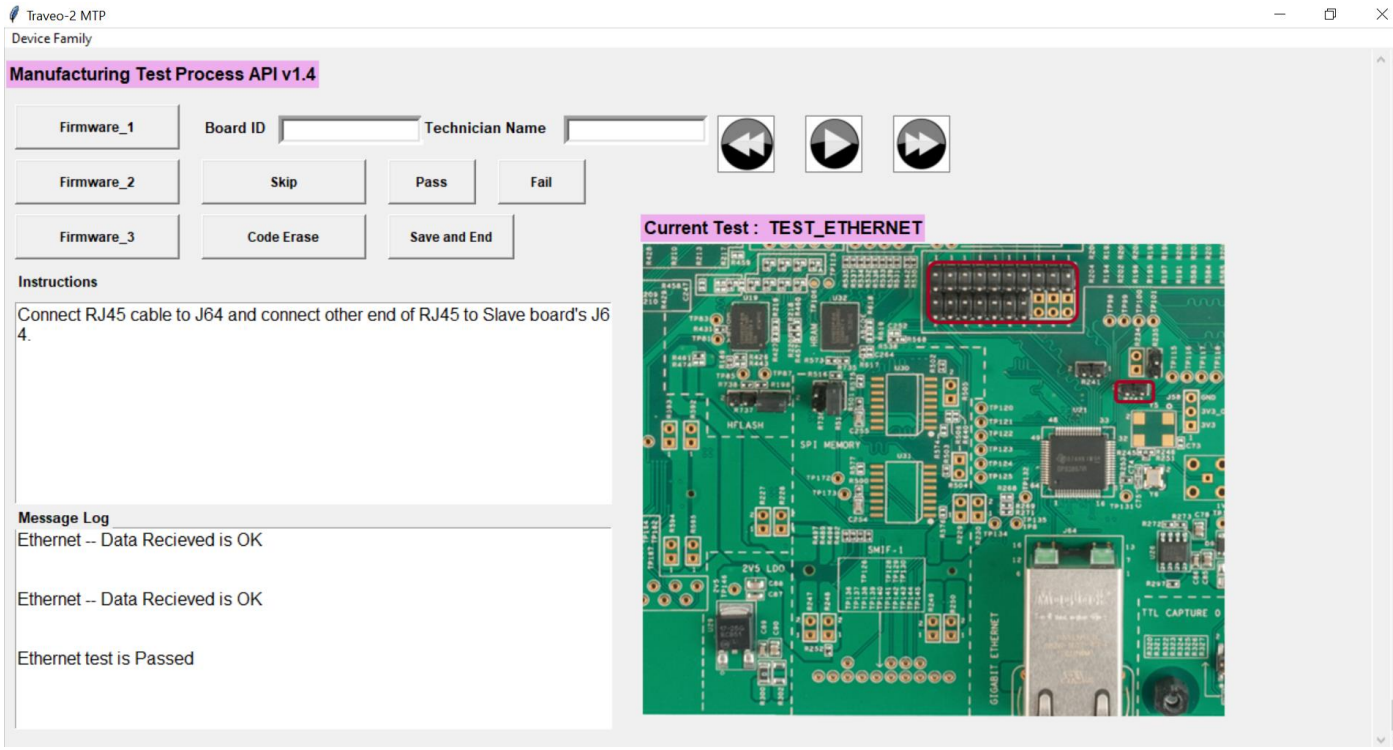


Figure 26 – Ethernet Test Pass Window

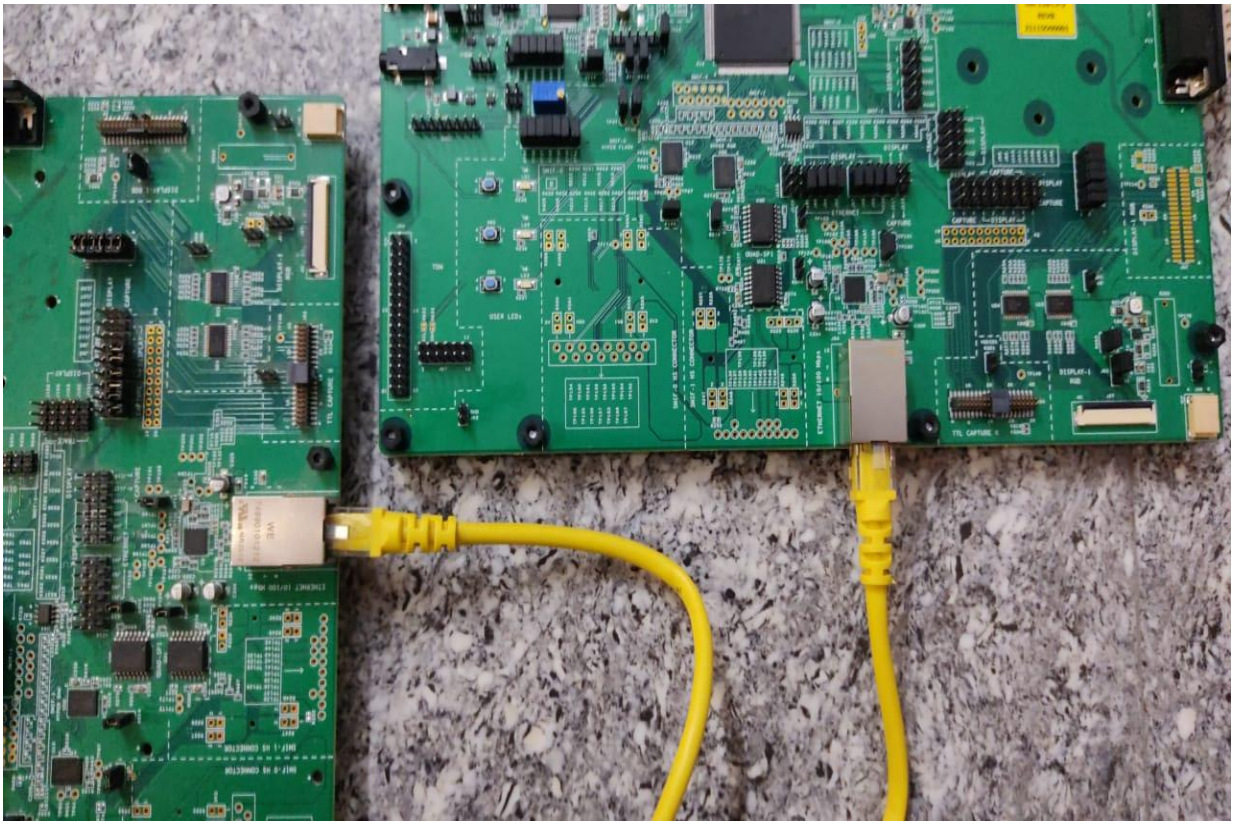


Figure 5 – Connecting the board under test to the gigabit ethernet test jig (Illustration)

7.13 WCO Test

- Now click on the next button and press the play button to start the WCO test
- Once the WCO test is started, WCO test result is shown automatically the total time taken by you to complete all the test as shown in the28.

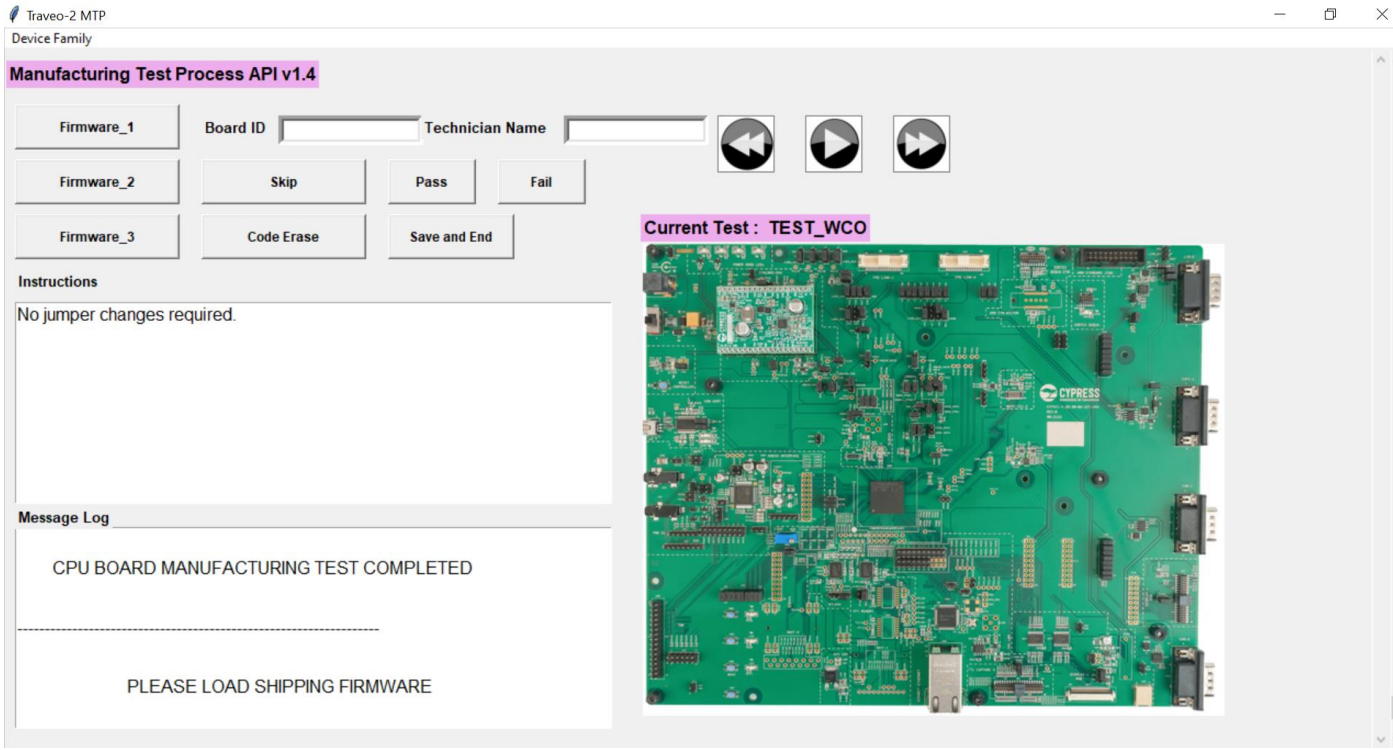


Figure 28 – WCO Test

7.14 Test Success

- Test summary will be displayed as shown in the Figure-29

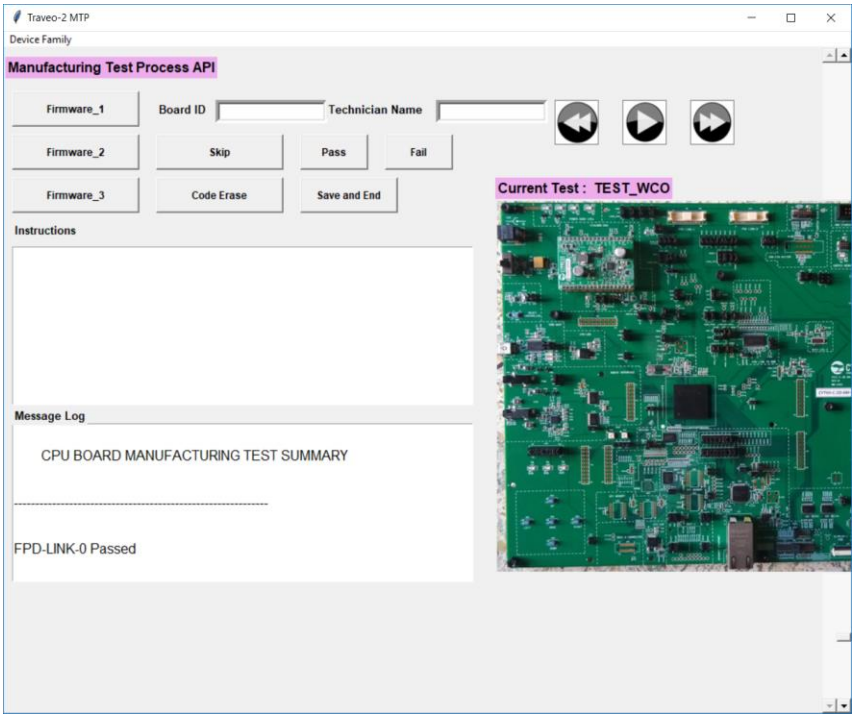


Figure 29 – Test Summary

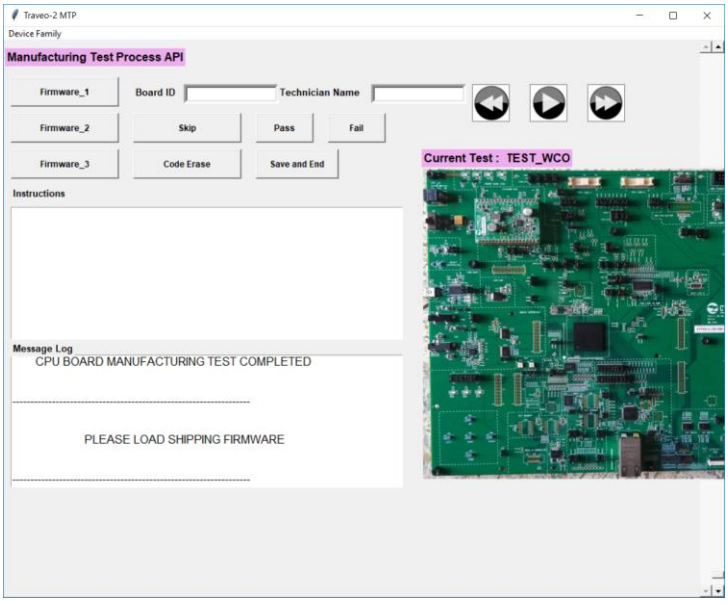


Figure 30 – Test Success

- At the completion of WCO Test, the test summary will be displayed on the Message log of the GUI. In the summary, all the test should indicate Passed status.

- If any of the test is a failure, then the tester needs to press reset button SW2, then again it will show the prompt for all the test, so the tester needs to perform the required test and skip the remaining test by pressing the Forward button on GUI.
- When any of the test is re-done again then at last the tester should perform the WCO test. This must be done irrespective of whether the test was done previously or not. If not done, then the test will be logged as a failure.
- So, once all the tests are passed the tester need to flash the factory firmware before shipping.

8. Flashing the Factory Firmware

8.1 For -CPU Board

- Connect the Miniprog4 using the JTAG adapter to ARM STANDARD JTAG (J7) and power on the CPU board
- Click the “Firmware3” button on GUI
- After successful flashing remove the miniprog-4 connected to the CPU board and press the Reset button (SW2) on the CPU board.
- LD1, LD2 and LD3 LED will be blinking and the test summary is displayed in the Message Log window as shown in the Figure-31.
- Enter the Board ID and name of the technician in the Board ID and Technician Name filed respectively.
- Now click the “Save and End” button on GUI.
- Close the GUI.
- Now remove the Display, cable, power adapter.
- Now the Board is ready for shipping.
- The tested board to be shipped with power adapter and USB mini-B cable with which the board was tested.

8.2 For -SET Board

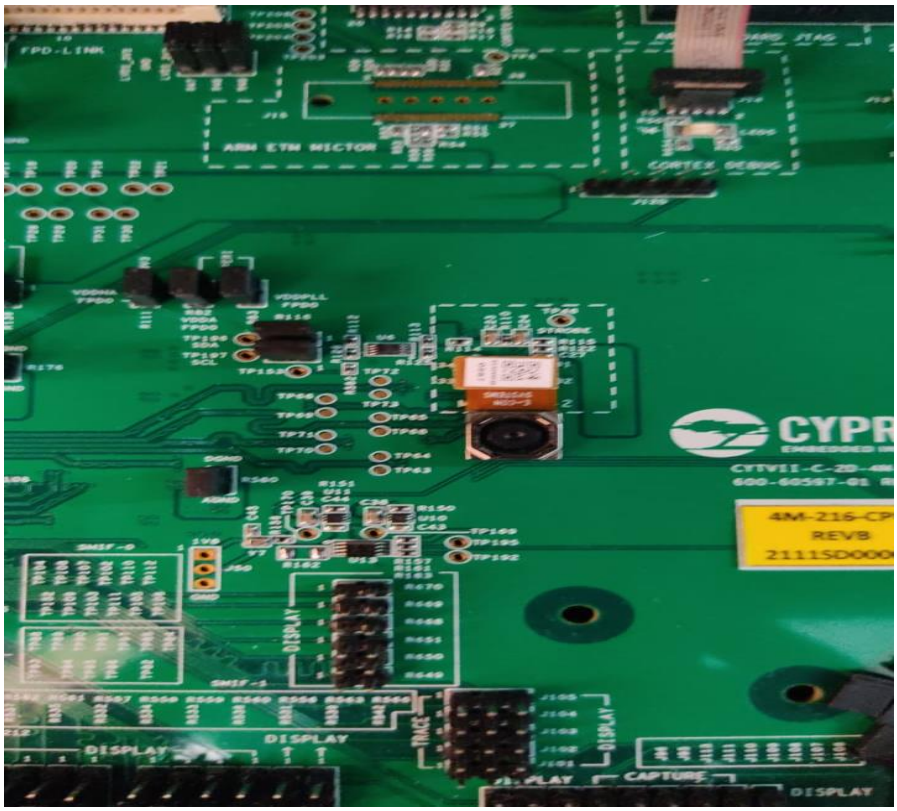


Figure 31 – MIPI Camera connection

- Connect the Miniprog4 using the JTAG adapter to ARM STANDARD JTAG (J7) and power on the CPU board
- Click the “Firmware3” button on GUI
- After successful flashing remove the miniprog-4 connected to the CPU board and press the Reset button (SW2) on the CPU board.
- You can see the image on the display which was captured by the MIPI camera. Also, LD2 will be blinking. This indicates the Shipping FW pass status.
- Enter the Board ID and name of the technician in the Board ID and Technician Name filed respectively.
- Now click the “Save and End” button on GUI.
- Close the GUI.
- Now remove the Display, cable, power adapter.
- Now the Board is ready for shipping.
- The tested board to be shipped with power adapter and USB mini-B cable with which the board was tested.

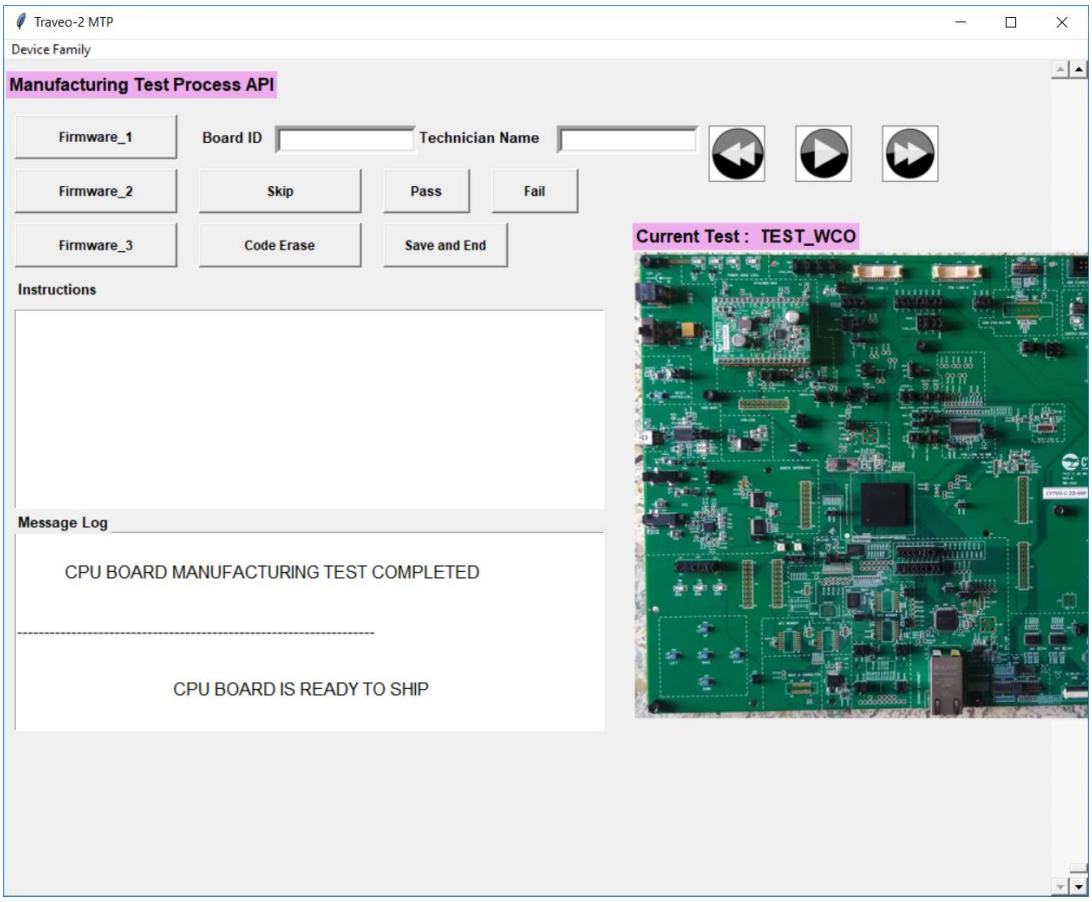


Figure 31 – CPU Board Shipping Status

Special Instructions for Failed Units:

a. In case some test fails, please redo the same by pressing the reset button (SW2) on the CPU board to confirm the failure.

b. Upon repeated failure, the board should be sent to Cypress India for debugging.

9. Appendix

Once all the tests are completed Leave the existing jumpers on the board as it is and ensure that the jumpers are connected as mentioned in the below table. Also ensure the SW1 is in OFF position and then pack the board for shipping.

Jumper# on Board to test	Position
J11	1-2
R18	1-2
R20	1-2
J21	1-2
J28	1-2
J30	1-2
J32	1-2
J34	1-2
R35	1-2
J35	1-2
R36	1-2
J36	1-2
R37	1-2
J37	1-2
R38	1-2
J38	1-2
R39	1-2
R40	1-2
J40	1-2
R41	1-2
R42	1-2
R43	1-2
R44	1-2
R45	1-2
R46	1-2
R47	1-2
R48	1-2
R49	1-2
R56	1-2
R57	1-2
J71	1-2
J72	1-2
J83	1-2
J89	1-2
R171	1-2
R176	1-2
R190	1-2
R191	1-2
R192	1-2
R193	1-2
R194	1-2
R195	1-2
R196	1-2
R197	1-2
R200	1-2
R201	1-2
R202	1-2
R203	1-2
R204	1-2
R205	1-2
R206	1-2

Jumper# on Board to test	Position
R207	1-2
R208	1-2
R199	1-2
R243	1-2
R293	1-2
R388	1-2
R392	1-2
R395	1-2
R397	1-2
R580	1-2
R581	1-2
R641	1-2
R642	1-2
R644	1-2
R657	1-2
R658	1-2
R659	1-2
R660	1-2
R661	1-2
R662	1-2
R672	1-2
R677	1-2
R678	1-2
R714	1-2
R715	1-2
R736	1-2
R82	1-2
R83	1-2
R109	1-2
R111	1-2
R127	1-2
R128	1-2
R134	1-2
R135	1-2
R136	1-2
R613	1-2
R614	1-2
R620	1-2
R621	1-2
R622	1-2
J116	1-2
J117	1-2
J118	1-2
J119	1-2
J120	1-2
J121	1-2
J122	1-2
J123	1-2
J124	1-2
J125	1-2
J126	1-2

Jumper# on Board to test	Position
J127	1-2
J128	1-2
J129	1-2
J130	1-2
J131	1-2
J132	1-2
J133	1-2
J134	1-2
J135	1-2
J136	1-2
J137	1-2
J138	1-2
J139	1-2
J3	2-3
J4	2-3
J5	2-3
J6	2-3
J16	2-3
J18	1-2
J19	2-3
J23	1-2
J26	2-3
J27	1-2
J29	1-2
J33	1-2
J52	2-3
J63	1-2
J74	2-3
J75	2-3
J84	2-3
J88	2-3
J114	2-3
J43	1-2
J47	1-2

Table 10 – Shipping Jumper Setting

Document History Page

Document Title: CYTVII-C-2D-6M-327-SET and CYTVII-C-2D-6M-327-CPU Manufacturing Test Procedure
Document Number: 002-34206

Rev.	ECN No.	Orig. of Change	Description of Change
**	7519977	AVEN	New Spec
*A	7766007	AVEN	New Jumper positions added, lifecycle procedure modified