KV(R)260 BIST Flow

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Revision History

Date	Version	Description
10/25/23	1.1	Add some information about difference between KR260 and KV260
09/24/23	1.0	Initial version for flow introduction.

XILINX.

KV(R)260 BIST Flow

- Must be connected to Ethernet port!

- Reference from [Setting up the Board and Application Deployment — Kria™ KV260 2022.1 documentation (xilinx.github.io)](xilinx.github.io)

- Download the following files: including Ubuntu 22.04 and Boot Firmware

  Boot Linux

  - Testing was performed with:

      - x07-20230302-63 Ubuntu 22.04 Linux Image
      - v2022.1-09152304_update3 Boot Firmware

- The minimum Linux kernel version required is 5.15.0.1022.26, or you will encounter the following error:

  Module ar1335 not found ---> mipi sensor not found

  ```
  ubuntu@kria:~$ sudo modprobe ar1335
  modprobe: FATAL: Module ar1335 not found in directory /lib/modules/5.15.0-1020-xilinx-zynqmp
  ```

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KV(R)260 BIST Flow

- Program the Ubuntu 22.04 through balenaetcher
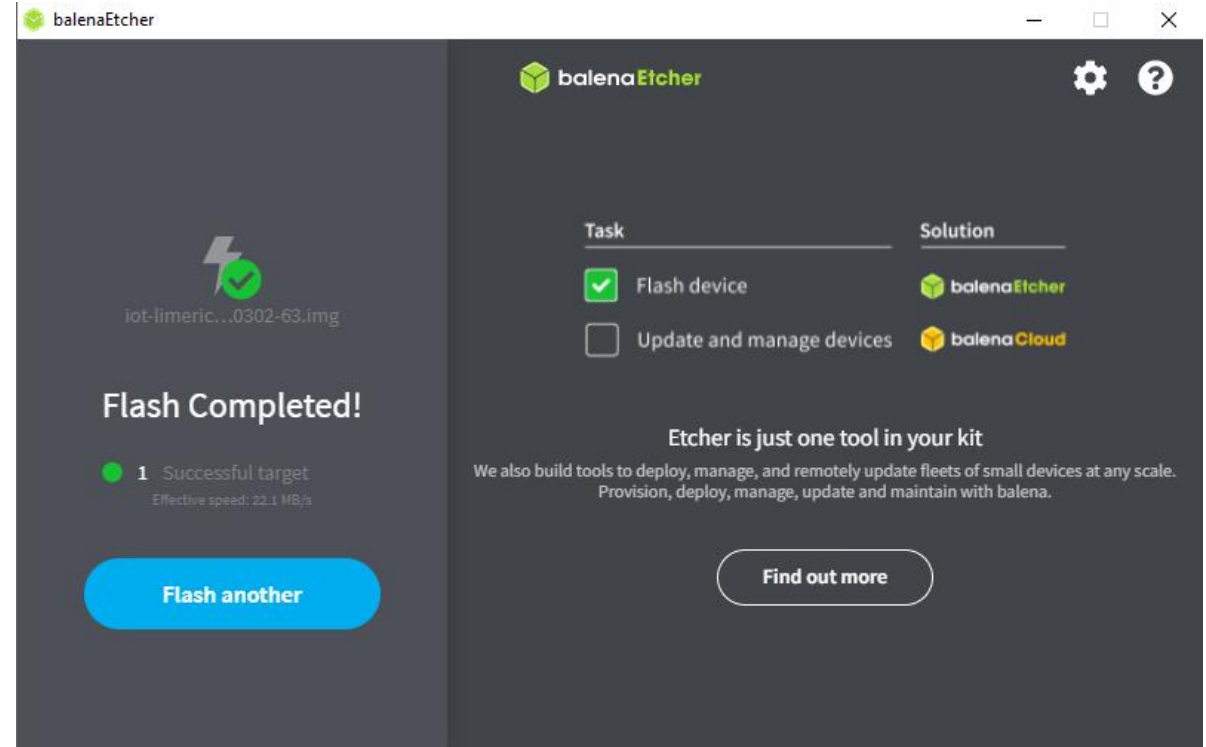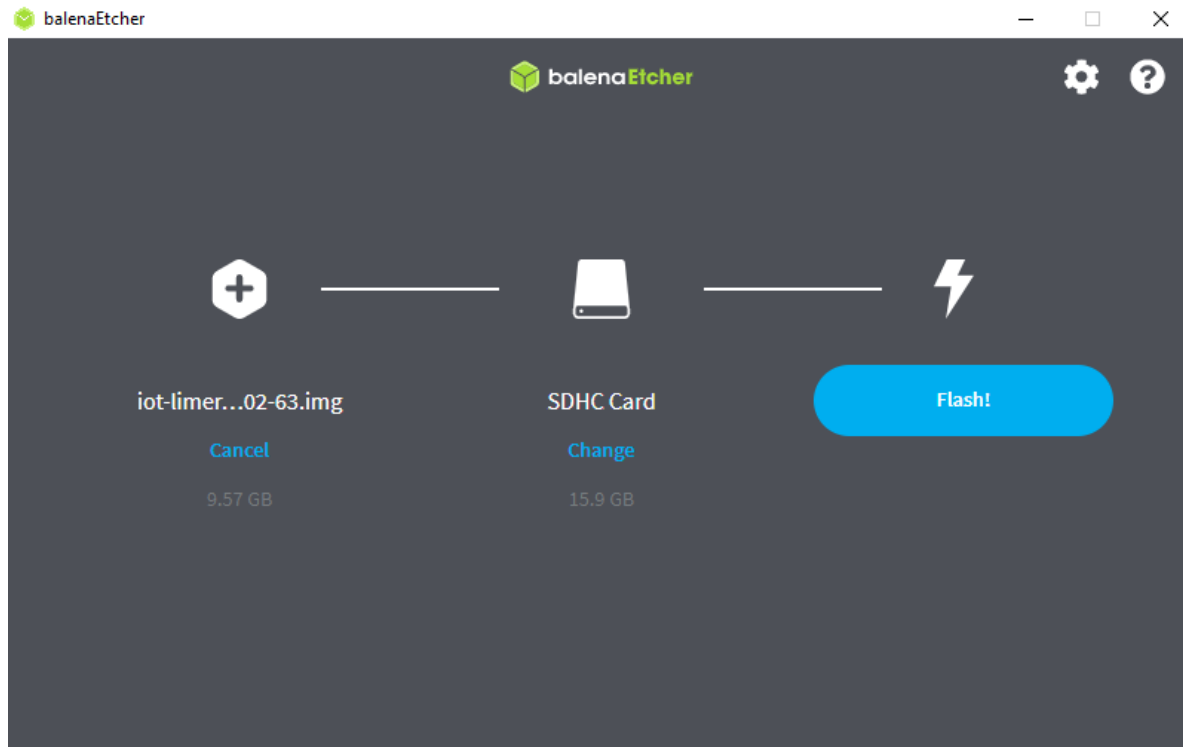
KV(R)260 BIST Flow

- Insert the SD card to KV260 and boot

- USB Flash Drive (x4) ①

- Ethernet Cable (x1) ②

- PMOD (x1) ③

- Monitor ④

- AR1335 IAS-ISP Image Sensor Module ⑤

- RaspberryPi Camera v2 module ⑥

- UART must be connected to PC

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KV(R)260 BIST Flow

- Login: ubuntu

- Password: ubuntu

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KV(R)260 BIST Flow

- Update the ubuntu 22.04 and Xilinx package

- sudo add-apt-repository ppa:xilinx-apps

  sudo apt update

  sudo apt upgrade

```
2.04.2 [45.8 kB]
Progress: [ 36%] [#####################.........................................] ipmi-ipmidetect arm64 1.6.9-2ubuntu0.22.
04.2 [33.7 kB]
Get:352 http://ports.ubuntu.com/ubuntu-ports jammy-updates/universe arm64 freeipmi all 1.6.9-2ubuntu0.22.04.2 [2480 B]
Get:353 http://ports.ubuntu.com/ubuntu-ports jammy-updates/main arm64 libc-ares2 arm64 1.18.1-1ubuntu0.22.04.2 [44.5 k
B]
Get:354 http://ports.ubuntu.com/ubuntu-ports jammy-updates/main arm64 libcanberra-gtk3-module arm64 0.30-10ubuntu1.22.
04.1 [10.2 kB]
Get:355 http://ports.ubuntu.com/ubuntu-ports jammy-updates/main arm64 python3-louis all 3.20.0-2ubuntu0.2 [7490 B]
Get:356 http://ports.ubuntu.com/ubuntu-ports jammy-updates/main arm64 python3-speechd all 0.11.1-1ubuntu3 [44.2 kB]
Fetched 440 MB in 2min 0s (3667 kB/s)
Extracting templates from packages: 100%
Preconfiguring packages ...
setting xserver-xorg-legacy/xwrapper/allowed_users from configuration file
(Reading database ... 179205 files and directories currently installed.)
Unpacking apport-gtk (2.20.11-0ubuntu82.5) over (2.20.11-0ubuntu82.3) ...  ...2.3) .... ......2.04.1) ....
```
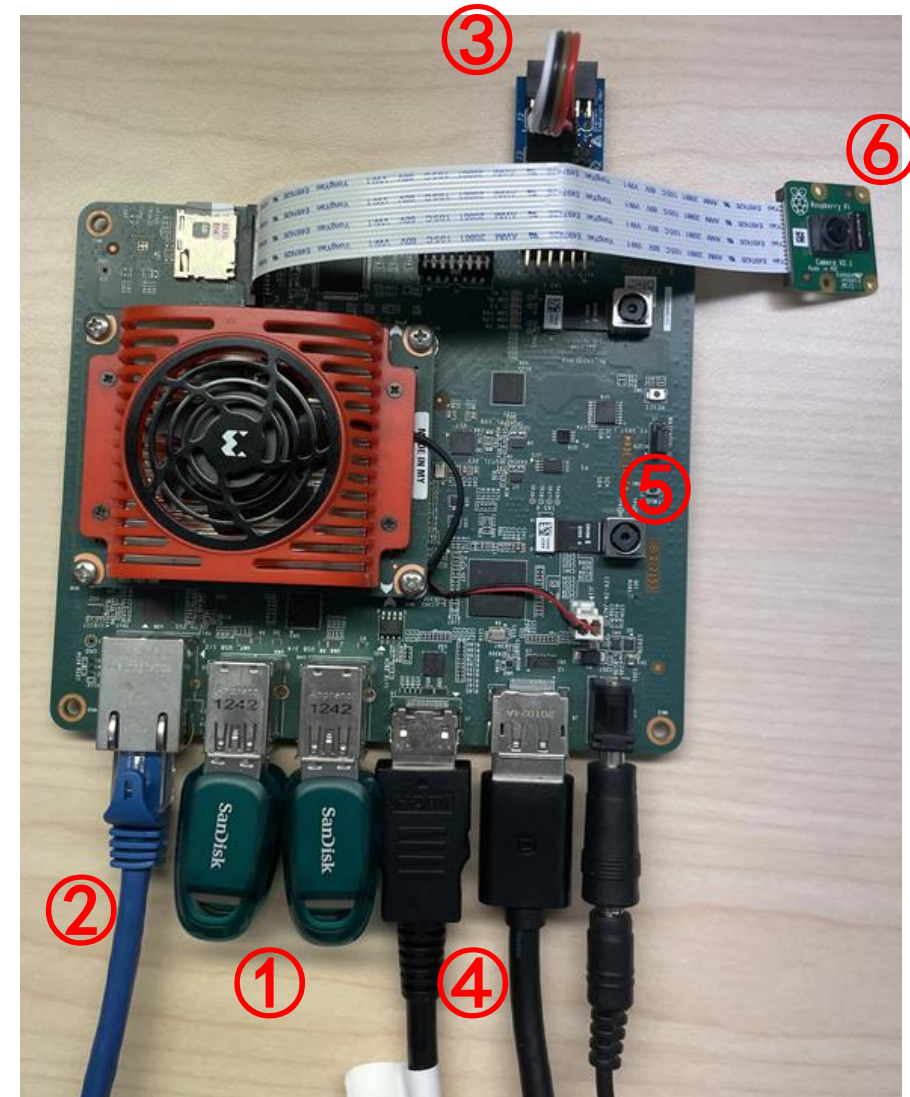
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KV(R)260 BIST Flow

- Update the flash kernel (KR260 may be different)

KV(R)260 BIST Flow

- apt search bist

- sudo apt install xlnx-firmware-kv260-bist

```
ubuntu@kria:~$ apt search bist
Sorting ... Done
Full Text Search ... Done
arachne-pnr/jammy 0.1+20190728gitc40fb22-2 arm64
  Place and route tool for iCE40 family FPGAs

elpa-verbiste/jammy 0.1.47-1build2 all
  French and Italian conjugator - emacs extension

libistack-commons-java/jammy 3.0.6-5 all
  Common code for some Glassfish projects

libverbiste-0.1-0v5/jammy 0.1.47-1build2 arm64
  French and Italian conjugator - shared library

libverbiste-dev/jammy 0.1.47-1build2 arm64
  French and Italian conjugator - development files

simulide/jammy 0.1.7+dfsg-2build1 arm64
  simple real time electronic circuit simulator

verbiste/jammy 0.1.47-1build2 arm64
  French and Italian conjugator

verbiste-el/jammy 0.1.47-1build2 all
  transitional package, verbiste-el to elpa-verbiste

verbiste-gnome/jammy 0.1.47-1build2 arm64
  French and Italian conjugator - GNOME interface

verbiste-gtk/jammy 0.1.47-1build2 arm64
  French and Italian conjugator - GTK app

xlnx-firmware-kr260-bist/jammy 0.9-0xlnx1 arm64
  FPGA firmware for Xilinx boards - kr260 bist application

xlnx-firmware-kv260-bist/jammy 0.9-0xlnx1 arm64
  FPGA firmware for Xilinx boards - kv260 bist application
```

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- sudo reboot ---> to renew the latest kernel version

- sudo xmutil listapps

- sudo xmutil unloadapp

- sudo xmutil loadapp kv260-bist

- sudo modprobe ar1335 (KR260 has no ar1335)

- sudo apt-get install docker.io

- sudo docker pull xilinx/kria-bist:2022.2

- sudo xmutil desktop_disable

- sudo systemctl stop fancontrol

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- sudo docker run \

  --env=DISPLAY \

  --env=XDG_SESSION_TYPE \

  --net=host \

  --privileged \

  --volume=/home/ubuntu/.Xauthority:/root/.Xauthority:rw \

  -v /tmp:/tmp \

  -v /dev:/dev \

  -v /sys:/sys \

  -v /etc/vart.conf:/etc/vart.conf \

  -v /lib/firmware/xilinx:/lib/firmware/xilinx \

  -v /run:/run \

  -it xilinx/kria-bist:2022.2 bash

Build Date: 2022/09/26 15:21
root@kria:/#

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KV(R)260 BIST Flow

- cd /opt/xilinx/kria-bist/tests

- Start Test!

  - pytest-3 --board kv260 ---> Run the entire BIST test suite for a target board

  - pytest-3 --collect-only --board kv260 ---> Show all test option ⟶

  - pytest-3 -k pmod0 --board kv260 ---> Run specific test option

```
root@kria:/opt/xilinx/kria-bist/tests# pytest-3 --collect-only --board kv260
======================== test session starts ========================
platform linux -- Python 3.10.6, pytest-6.2.5, py-1.10.0, pluggy-0.13.0
rootdir: /opt/xilinx/kria-bist/tests, configfile: pytest.ini
plugins: anyio-3.6.1
collected 40 items

<Module disk/test_bist_disk.py>
  <Function test_disk[usb1_read_performance]>
  <Function test_disk[usb1_write_performance]>
  <Function test_disk[usb2_read_performance]>
  <Function test_disk[usb2_write_performance]>
  <Function test_disk[usb3_read_performance]>
  <Function test_disk[usb3_write_performance]>
  <Function test_disk[usb4_read_performance]>
  <Function test_disk[usb4_write_performance]>
  <Function test_disk[sd_read_performance]>
  <Function test_disk[sd_write_performance]>
<Module display/test_bist_display.py>
  <Function test_display[display_connectivity]>
  <Function test_display[display_modetest]>
<Module eeprom/test_bist_eeprom.py>
  <Function test_eeprom[som_eeprom]>
  <Function test_eeprom[carrier_card_eeprom]>
<Module eth/test_bist_eth.py>
  <Function test_eth[ethernet1_ping]>
  <Function test_eth[ethernet1_perf]>
<Module gpio/test_bist_gpio.py>
  <Function test_gpio[pmod0]>
<Module i2c/test_bist_i2c.py>
  <Function test_i2c[ps_i2c_bus_main]>
  <Function test_i2c[axi_i2c_bus_main]>
  <Function test_i2c[axi_i2c_bus_ch0]>
<Module iio/test_bist_iio.py>
  <Function test_iio[ina260_current]>
<Module mtd/test_bist_mtd.py>
  <Function test_mtd[qspi_read_write]>
  <Function test_mtd[qspi_read_performance]>
  <Function test_mtd[qspi_write_performance]>
<Module pwm/test_bist_pwm.py>
  <Function test_pwm[fan]>
<Module tpm/test_bist_tpm.py>
  <Function test_tpm[tpm2_getcap]>
  <Function test_tpm[tpm2_selftest]>
  <Function test_tpm[tpm2_getrandom]>
  <Function test_tpm[tpm2_hash]>
  <Function test_tpm[tpm2_pcrread]>
  <Function test_tpm[tpm2_pcrextend]>
  <Function test_tpm[tpm2_pcrreset]>
<Module video/test_bist_video.py>
  <Function test_video[ar1335_ap1302_ximagesink]>
  <Function test_video[ar1335_ap1302_perf]>
  <Function test_video[tpg_ap1302_ximagesink]>
  <Function test_video[tpg_ap1302_perf]>
  <Function test_video[imx219_filesink]>
  <Function test_video[imx219_perf]>
  <Function test_video[ar1335_filesink]>
  <Function test_video[ar1335_perf]>
==================== 40 tests collected in 1.21s ====================
```
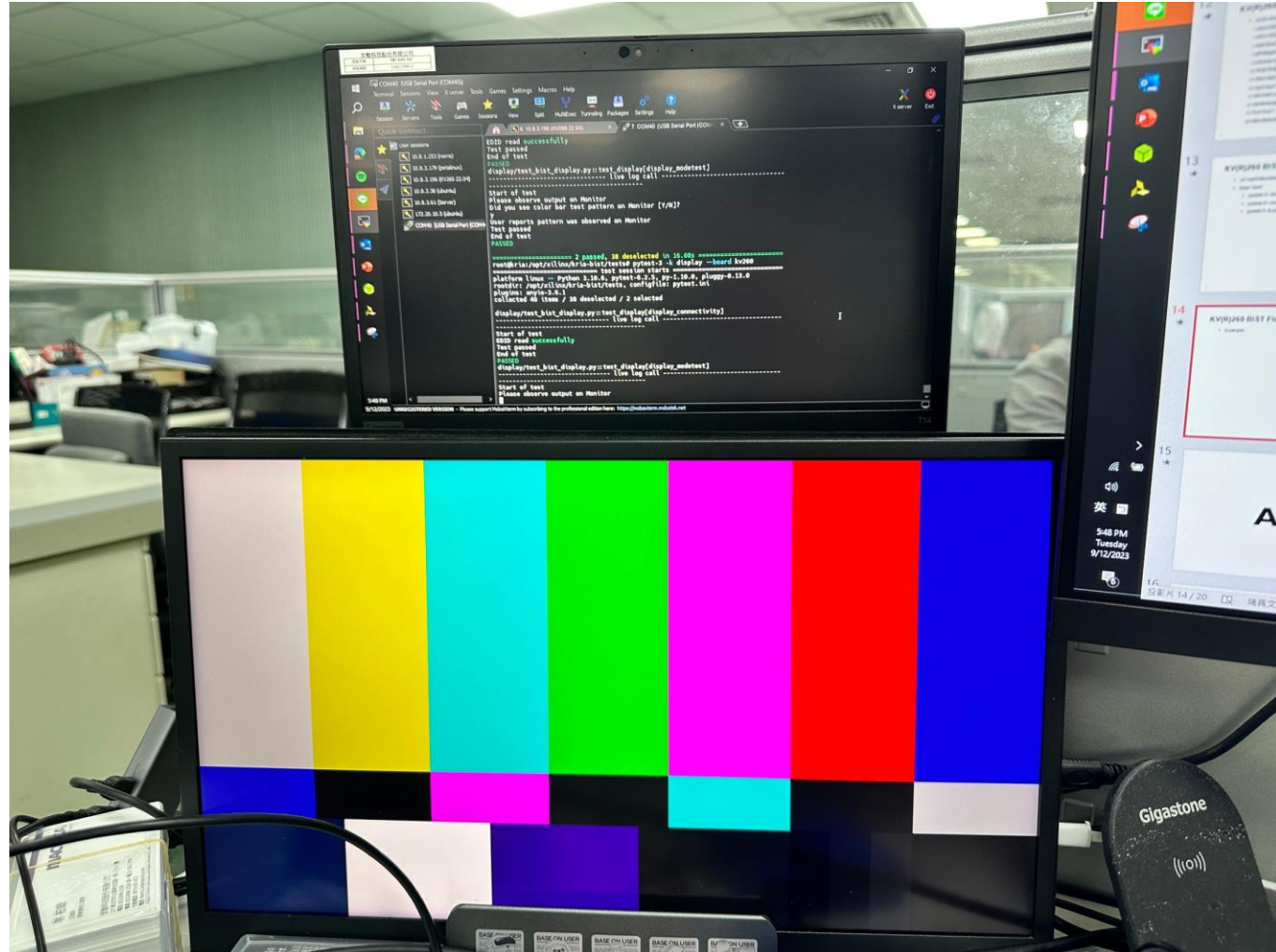
KV(R)260 BIST Flow

- Example

- pytest-3 -k display --board kv260

KV(R)260 BIST Flow

- Example

- pytest-3 --board kv260

```
----------------------------------------
Start of test
Device path of SD port: /dev/mmcblk1p2
Device data transfer standard: SD Speed UHS-class
Available disk space: 13844.68MiB
Device mounted. Mountpoint: /dev/mmcblk1p2 on /media/disk/mmcblk1

Minimum expected Read speed for SD Speed UHS-class devices: 12 MB/s
The indicated threshold values may not be accurate for your specific device. Please verify correct values with the dev
ice manufacturer
Measured Read speed: 15.9 MB/s
Read performance test passed for SD port

Device unmounted
Test passed
End of test
PASSED
disk/test_bist_disk.py::test_disk[sd_write_performance]
------------------------------- live log call ----------------------------------
----------------------------------------
Start of test
Device path of SD port: /dev/mmcblk1p2
Device data transfer standard: SD Speed UHS-class
Available disk space: 13844.68MiB
Device mounted. Mountpoint: /dev/mmcblk1p2 on /media/disk/mmcblk1

Minimum expected Write speed for SD Speed UHS-class devices: 6 MB/s
The indicated threshold values may not be accurate for your specific device. Please verify correct values with the dev
ice manufacturer
Measured Write speed: 9.2 MB/s
Write performance test passed for SD port

Device unmounted
Test passed
End of test
PASSED
display/test_bist_display.py::test_display[display_connectivity]
```

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KV(R)260 BIST Flow

- Example

- pytest-3 --board kv260

```
------------------------------------------
Start of test
FRU Inventory From File: /sys/devices/platform/axi/ff030000.i2c/i2c-1/1-0050/eeprom

  FRU Board Manufacturing Date/Time: 06/14/21 - 12:06:00
  FRU Board Manufacturer: XILINX
  FRU Board Product Name: SMK-K26-XCL2G
  FRU Board Serial Number: XFL12WUYH5ET
  FRU Board Part Number: 5057-01
  FRU FRU File ID: 00h
  FRU Board Custom Info: 1
  FRU Board Custom Info: 10h EEh 00h 00h 00h 00h 00h 00h
  FRU Board Custom Info: A5h F8h 6Eh 8Fh 48h 5Eh 4Ah 54h 82h 1Ch 9Fh 6Ch 3Dh C8h B2h 82h

  FRU DC Load Output Number: 1
  FRU DC Load Nominal Voltage: 5000 mV
  FRU DC Load Spec'd Minimum Voltage: 4500 mV
  FRU DC Load Spec'd Maximum Voltage: 5500 mV
  FRU DC Load Spec'd Ripple and Noise pk-pk: 100 mV
  FRU DC Load Minimum Current Load: 0 mA
  FRU DC Load Maximum Current Load: 4000 mA

  FRU OEM Manufacturer ID: Xilinx, Inc. (10DAh)
  FRU OEM Data: 31h 00h 0Ah 35h 0Ah 80h 64h

  FRU Error: multirecord area checksum invalid
ipmi_fru_next: multirecord area checksum invalid

Expected FRU Board Product Name is: K26
FRU Board Product Name from EEPROM: K26
A multirecord area checksum is invalid. This is likely a known issue. Please double check the EEPROM output.
Test passed
End of test
PASSED
eeprom/test_bist_eeprom.py::test_eeprom[carrier_card_eeprom]
```

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KV(R)260 BIST Flow

- Example

- pytest-3 --board kv260

```
------------------------------
Start of test
All expected I2C devices on the bus have been successfully detected
Test passed
End of test
PASSED
i2c/test_bist_i2c.py::test_i2c[axi_i2c_bus_main]
----------------------------- live log call -------------------------------
------------------------------
Start of test
All expected I2C devices on the bus have been successfully detected
Test passed
End of test
PASSED
i2c/test_bist_i2c.py::test_i2c[axi_i2c_bus_ch0]
----------------------------- live log call -------------------------------
------------------------------
Start of test
All expected I2C devices on the bus have been successfully detected
Test passed
End of test
PASSED
iio/test_bist_iio.py::test_iio[ina260_current]
----------------------------- live log call -------------------------------
------------------------------
Start of test
The current is 886.25 mA, which is within the range of 750 to 1050.
Test passed
End of test
PASSED
mtd/test_bist_mtd.py::test_mtd[qspi_read_write]
```

18

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KV(R)260 BIST Flow

- Example

- pytest-3 --board kv260

```
-----------------------------------------
Start of test
MTD User partition on QSPI: mtd16
Size of MTD User partition: 29.38MiB
Memory erase successful. 1.0MiB of memory erased at offset 196608 bytes on MTD User partition

QSPI write of test file successful
QSPI read of test file successful
Test file match between written and read-back data on MTD partition

QSPI read and write test passed
Test passed
End of test
PASSED
mtd/test_bist_mtd.py::test_mtd[qspi_read_performance]
------------------------------ live log call ----------------------------------
-----------------------------------------
Start of test
MTD User partition on QSPI: mtd16
Size of MTD User partition: 29.38MiB

Minimum expected Read speed for QSPI MTD partition: 12 MB/s
Measured Read speed: 14.6 MB/s

QSPI Read performance test passed
Test passed
End of test
PASSED
mtd/test_bist_mtd.py::test_mtd[qspi_write_performance]
```

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KV(R)260 BIST Flow

- Example

- pytest-3 --board kv260

```
-------------------------------------------
Start of test
MTD User partition on QSPI: mtd16
Size of MTD User partition: 29.38MiB
Memory erase successful. 1.0MiB of memory erased at offset 196608 bytes on MTD User partition

Minimum expected Write speed for QSPI MTD partition: 350 KB/s
Measured Write speed: 480.0 KB/s

QSPI Write performance test passed
Test passed
End of test
PASSED
pwm/test_bist_pwm.py::test_pwm[fan]
```

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KV(R)260 BIST Flow

- Example

- pytest-3 --board kv260

```
-----------------------------------------------
Start of test
MTD User partition on QSPI: mtd16
Size of MTD User partition: 29.38MiB
Memory erase successful. 1.0MiB of memory erased at offset 196608 bytes on MTD User partition

Minimum expected Write speed for QSPI MTD partition: 350 KB/s
Measured Write speed: 480.0 KB/s

QSPI Write performance test passed
Test passed
End of test
PASSED
pwm/test_bist_pwm.py::test_pwm[fan]
```

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KV(R)260 BIST Flow

- Example

- pytest-3 --board kv260

APPENDIX A: Temporary failure in name resolution Error

- We can survey the following link to solve this problem:

[Ubuntu 20.04 server不能ping，提示 "Temporary failure in name resolution"的解决方法_Donald Su的博客-CSDN博客](#)

- Conclusion:

sudo systemctl restart systemd-resolved.service

this command will solve this problem

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APPENDIX B: Install BIN file on KV260

- Install v2022.1-09152304_update3 Boot Firmware

sudo xmutil bootfw_update -i <path to boot.bin>

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APPENDIX C: Unsupported authorisation protocol

- xauth -v list

  Using authority file /home/ubuntu/.Xauthority

  kria/unix:10 MIT-MAGIC-COOKIE-1 f5212118305f75678a69daa4a6eda703

- If incorrect or no authority file present, do the following steps:

  - rm -rf ~/.Xaut*

  - sudo reboot

```
ubuntu@kria:~$ xauth -v list
Using authority file /home/ubuntu/.Xauthority
kria/unix:10  MIT-MAGIC-COOKIE-1  792533d1e3535432135f8683f4a99550
```

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