AIR-020_A101-2
Component Change
Function Test Report

Initiated by	Jeff65.Cheng	**Approved by**	Shane GH

Revision History：

Date	Revision	Description	Creator
2024/02/29	V1.0	The First version released for AIR-020 PVT image AIR-020 apply DQA test for JetPack 5.1.2 image.	Jeff65.Cheng

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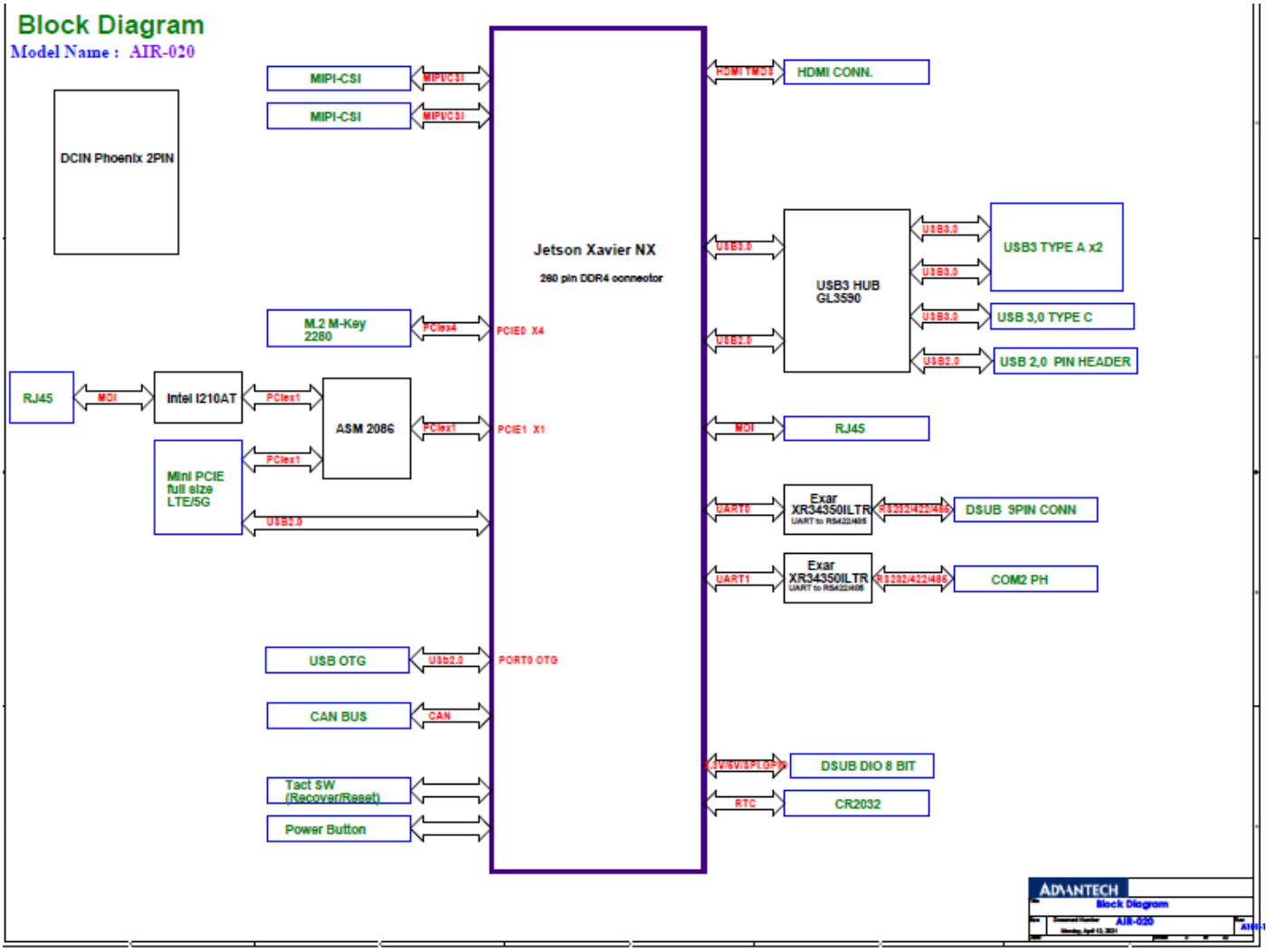
Product Specification：



	AIR-020N Jetson Nano	AIR-020T Jetson TX2 NX	AIR-020X Jetson Xavier NX
CPU	Quad core ARM Cortex® A57	Dual core Denver 2 and quad-core Arm® Cortex®-A57 processor complex	Six core Carmel ARM v8.2
GPU	Maxwell 128 CUDA	Pascal 256 CUDA	Volta 384 CUDA+ 48 Tensor cores
Memory	4GB 64bit LPDDR4	4GB 128bit LPDDR4	8GB 128bit LPDDR4
Flash	16GB of eMMC 5.1	16GB of eMMC 5.1	16GB of eMMC 5.1
Display	1x HDMI 2.0, max. 3840x2160@30Hz		
Ethernet	1x GbE	2 x GbE	2x GbE
GPIO	1, 4bit In, 4bit Out	1, 4bit In, 4bit Out	1, 4bit In, 4bit Out
COM	1 x RS232/RS422/RS485	1 x RS232/RS422/RS485	2 x RS232/RS422/RS485
USB	2x USB 3.0	2x USB 3.0 (gen1)	2x USB 3.1
CANBus	NA	Reserved	1, DB9
OTG	Micro USB	Micro USB	Micro USB
Extra Storage	1x M.2 2280 M key	1x M.2 2280 M key, NVMe	1x M.2 2280 M key, NVMe
Expansion	LTE or BT supported	5G or WIFI6 supported	5G or WIFI6 supported
Dimension	139 x 110 x 44.5 mm		
Power input	12-24V Pheonix connector		
Working temp.	-20~60C w/ 0.7 m/s air flow		

System Configuration：

Item.	Description.
Project Name.	AIR-020X
M/B Name	Jetson Xavier
Carrier Board Model.	AIR-020
Carrier Version.	A101-2
CPU Model/Info	Xavier NX : ARMv8 Processor rev 0 (v8l) x4
Memory Type/Info/Size	Xaiver NX : 4GB 128bit LPDDR4
Graphic Controller	Xavier NX : NVIDIA Tegra Xaiver (nvgpu)/integrated
LAN1 Controller	On chip GBE
LAN2 Controller	Intel I210AT
HDD Type/Info.	Flash 16GB of eMMC 5.1
NVME Type/Info	Advantech SQF-C8MV2-128GCEDC 128GB PCIe Gen. III x2 interface and NVMe 1.3
Power Supply Model	ADP-65JH HB OUTPUT 19.0V 3.42A 65W
Display Monitor	DELL P2319H HDMI Output
Test OS Version	Ubuntu 20.04
Image File Version	air020_image_20240124_dqatest.tar.gz air020_image_20231212_poweronoff_atx_mode.tar.gz (for power on/off test)

Test Utility and Tool List：

Title	Version	Remark
burnin.sh	NA	
http://ess-wiki.advantech.com.tw/view/AIR_020_Development	NA	

Test Equipment：

Model	Description
Serial Port cable for RS485 test	
COM RS232 Loopback Plug	
WLAN Access Point (Model. ASUS RT-AC66U Dual Band x3 802.11 AC Gigabit Router)	
Advantech Power on/off test equipment (ATX/AT)	

Test Results Definition：

Criteria	Definition
PASS	Test result pass and function work perfectly.
Fail	Test fail or cannot meet the spec requirement.
Limitation	There are no plans to fix this function.
N/A	Not Available or Not Applicable.
Check Next Version	HW modified circuit and solution verified, and checks the function result has pass. Need to check next version.

Test Results Summary：

Num.	Test Item	Result	Remark
1	**Function**		
1.01	Support Processor and Memory SPEC Check	**PASS**	
1.02	Output Display Function	**PASS**	
1.03	Storage Function	**PASS**	
1.04	USB Function	**PASS**	
1.05	Wired LAN Function	**PASS**	
1.06	Serial Port Function	**PASS**	
1.07	Jumper/Connector/Pin Header Function	**PASS**	
1.08	CAN BUS Function	**PASS**	
1.09	GPIO Port Function	**PASS**	
1.10	Mini PCIe Basic Function	**PASS**	
1.11	MIPI-CSI Basic Function	**PASS**	
2	**Reliability**		
2.01	RTC	**PASS**	
2.02	PowerOn/Off Test	**PASS**	

1. Function

1.01 Support Processor and Memory SPEC Check

1.01.01 Support CPU SPEC Test

1.01.01.01.01 Test Purpose：

The purpose of this test is to validate and ensure the CPU Specification.

1.01.01.01.02 Test Data:

Test Item	Description	Result	Remark
CPU SPEC Information Check	Jetson Xavier NX: ARMv8 Processor rev 0 (v8l) x4	**PASS**	

1.02 Output Display Function

1.02.01 HDMI Output Display Function Test

1.02.01.01.01 Test Purpose：

The purpose of this test is to examine the function of HDMI interface.

1.02.01.01.02 Test Data：

Test Item	Description	Location	Result	Remark
HDMI function	Display resolution check at 1080P. 1920x1080, 60 Hz	HDMI (HDMI1)	**PASS**	
	3840×2160, 30Hz (HDMI 1.4)	HDMI (HDMI1)	**PASS**	
	3840×2160, 60Hz (HDMI 2.0)	HDMI (HDMI1)	**PASS**	
	Max resolution (SPEC) check under OS. Max spec resolution: **=> 4096×2160, 60Hz** Monitor Model and Fixture No. **=> ViewSonic VX2475SMHL 24"**	HDMI (HDMI1)	**PASS**	

1.03 Storage Function

1.03.01 M.2 Function Test

1.03.01.01.01 Test Purpose：

The test is to ensure the on-board M.2 socket functionality could work properly.

1.03.01.01.02 Test Data：

Test Item	Description	Location	Result	Remark
M.2 (NVME)	Test program: Burnin.sh. Device Model and fixture No. => SQF-C8MV2-128GCEDC	NVME1	**PASS**	

1.04 USB Function

1.04.01 USB3.2 and USB3.0 Gen1 Function Test

1.04.01.01.01 Test Purpose：

The purpose of this test is to ensure the USB3.2 port functional of DUT.

1.04.01.01.02 Test Data：

Test Item	Description	Location	Result	Remark
USB3.0 Type A Function Test	Test program: Burnin.sh => Check on each USB3.0 ports. => USB3.0: Transcand JetFlash790W 16G (US-A00553)	USB3 (up/down)	**PASS**	
USB3.2 Type C-plug Function Test	Test program: Burnin.sh. => Check on each USB3.2 ports. => USB3.2: Type-C: Kingston DT70 512G (US-A00741)	USB Type-C	**PASS**	

1.04.02 Micro USB (OTG) Function

1.04.02.01.01 Test Purpose：

The purpose of this test is to validate and ensure the functional of the Micro USB (OTG) Port.

1.04.02.01.02 Test Data:

Test Item	Description	Location	Result	Remark
Micro USB port Function Check.	Update image from Micro USB (OTG) port function check	OTG	**PASS**	

1.05 Wired LAN Function

1.05.01 LAN Basic Function Test

1.05.01.01.01 Test Purpose：

The purpose of this test is to examine the wired LAN basic function and to ensure the functional of Ethernet controllers.

1.05.01.01.02 Test Data：

Test Item	Description	Location	Result	Remark
LAN Function Test.	Connecting internet to surfing websites under OS.	LAN1	**PASS**	
		LAN2	**PASS**	
	Ping IP:192.168.11.1 for 100 times	LAN1	**PASS**	
		LAN2	**PASS**	

1.06 Serial Port Function

1.06.01 Serial Port Function Test

1.06.01.01.01 Test Purpose：

The purpose of this test is to ensure the system Serial Port function.

1.06.01.01.02 Test Data：

Test Item	Description	Location	Result	Remark
RS-232 Function	Use putty test program to send message via External Loopback to make sure com port function properly sudo apt update sudo apt install -y putty	COM1	**PASS**	

Test Item	Description	Location	Result	Remark
	sudo putty Connection type: Serial Serial line: /dev/ttyTHS1(COM1) /dev/ttyTHS0(COM2) Speed: 115200	COM2	**PASS**	
RS-422 Function	Use putty test program to send message via External Loopback to make sure com port function properly sudo apt update sudo apt install -y putty sudo putty Connection type: Serial Serial line: /dev/ttyTHS1(COM1) /dev/ttyTHS0(COM2) Speed: 115200	COM1	**PASS**	
		COM2	**PASS**	
RS-485 Function	**Xavier:** Send message from COM1 to COM2 make sure com port function properly (terminal set off) SW1/SW2 ON-ON-OFF-OFF COM1 -> COM2 echo 447 > /sys/class/gpio/export echo out > /sys/class/gpio/PR.04/direction stty -F /dev/ttyTHS1 speed 115200 stty -F /dev/ttyTHS0 speed 115200 cat /dev/ttyTHS0 & echo 1 > /sys/class/gpio/PR.04/value echo "1234" > /dev/ttyTHS1 echo 0 > /sys/class/gpio/PR.04/value --- Send message from COM2 to COM1 make sure com port function properly (terminal set off) COM2 -> COM1 echo 482 > /sys/class/gpio/export echo out > /sys/class/gpio/PX.06/direction stty -F /dev/ttyTHS1 speed 115200 stty -F /dev/ttyTHS0 speed 115200 cat /dev/ttyTHS1 & echo 1 > /sys/class/gpio/PX.06/value echo "1234" > /dev/ttyTHS0 echo 0 > /sys/class/gpio/PX.06/value	COM1	**PASS**	
		COM2	**PASS**	

1.07 Jumper/Connector/Pin Header Function

1.07.01 Power Button and Reset Button Function Test

1.07.01.01.01 Test Purpose：

The purpose of this test is to examine the GPIO Connector function.

1.07.01.01.02 Test Data：

Test Item	Description	Location	Result	Remark
Power Button	Press the Power Button to start up the system normally	SW2	**PASS**	

1.08 CAN BUS Function

1.08.01.01.01 Test Purpose:

A controller area network (CAN Bus) is a vehicle bus standard designed to allow microcontrollers and devices to communicate with each other in applications without a host computer. It is a message-based protocol, designed originally for multiplex electrical wiring within automobiles, but is also used in many other contexts.

The purpose of this test is to examine the CAN Bus connector function of the test platform.

1.08.01.01.02 Test Data:

Test Item	Description	Location	Result	Remark

CAN Bus Connect Function Test.	Connect two DUT CAN Bus device and run the command below to examine connector function.
	Both DUT:
	$ modprobe can
	$ modprobe can-dev
	$ modprobe mttcan
	$ ip link set can0 type can bitrate 500000
	$ ip link set can0 up
	$ ip link set can1 type can bitrate 500000
	$ ip link set can1 up
	Received DUT:
	$ candump can1
	Send DUT:
	$ cansend can0 123#abcdabcd
		CANBUS	**PASS**	

1.09 GPIO Port Function

1.09.01.01.01 Test Purpose：

The purpose of this test is to examine the GPIO function.

1.09.01.01.02 Test Data：

Test Item	Description	Location	Result	Remark
GPIO Function	USE GPIO loop back to verify the GPIO function is normally	Digital I/O (DIO1)	**PASS**	

1.10 Mini PCIe Basic Function

1.10.01.01.01 Test Purpose：

The test is to ensure the Mini PCIe slot functionality could work properly.

1.10.01.01.02 Test Data：

Test Item	Description	Location	Result	Remark
Mini PCIE Slot Function	Read/Write Test. Connect to https://tw.speedtest.net for test Mini-PCIE Card: => EWM-W189H02E(WIFI)	MINI_PCIE1	**PASS**	
	Use Mini PCIE device via USB signal to check function. Mini-PCIE Card: => EWM-W189H02E(BT)	MINI_PCIE1	**PASS**	

1.11 MIPI-CSI Basic Function

1.11.01.01.01 Test Purpose：

The test is to ensure the MIPI-CSI socket functionality could work properly.

1.11.01.01.02 Test Data：

Test Item	Description	Location	Result	Remark
MIPI-CSI Function	Connect MIPI-CSI camera to make sure MIPI-CSI socket is function properly MIPI-CSI Camera Card: => Raspberry Pi Camera V2	CN4	**PASS**	
		CN6	**PASS**	

2 Reliability

2.01 RTC

2.01.01 System Timer Test

2.01.01.01.01 Test Purpose:

The purpose of this test is to ensure the functional of the system timer.

2.01.01.01.02 Test Data:

Test Item	Description	Result	Remark
System Timer	System time must <= +-2 sec/24 hours under room temperature.	**PASS**	

2.01.02 RTC Timer Test

2.01.02.01.01 Test Purpose:

The purpose of this test is to ensure the functional of the RTC timer.

2.01.02.01.02 Test Data:

Test Item	Description	Result	Remark
RTC Timer	RTC time must <= +-2 sec/24 hours under room temperature.	**PASS**	

2.02 Power On/Off Test

2.02.01.01.01 Test Purpose：

The purpose of this test is to validate the stability of the DUT after Power On/Off cycling test.

2.02.01.01.02 Test Data：

Test Item	Description	Result	Remark
Power ON/OFF Test	AT Mode. Power ON/OFF test. Motherboard ATX/AT Jumper setting at “AT” Mode. PASS criteria 1. => 1000 loops, booting rate=100% 2. Every time the system boots into the OS, LAN and NVME can be detected and cannot be lost.	**PASS**	