

AIR-020_A101-1

EVT Function Test Report

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Revision History :

Date	Revision	Description	Creator
2021/09/15	V1.0	The First version released for AIR-020 EVT function test Report.	Shane GH

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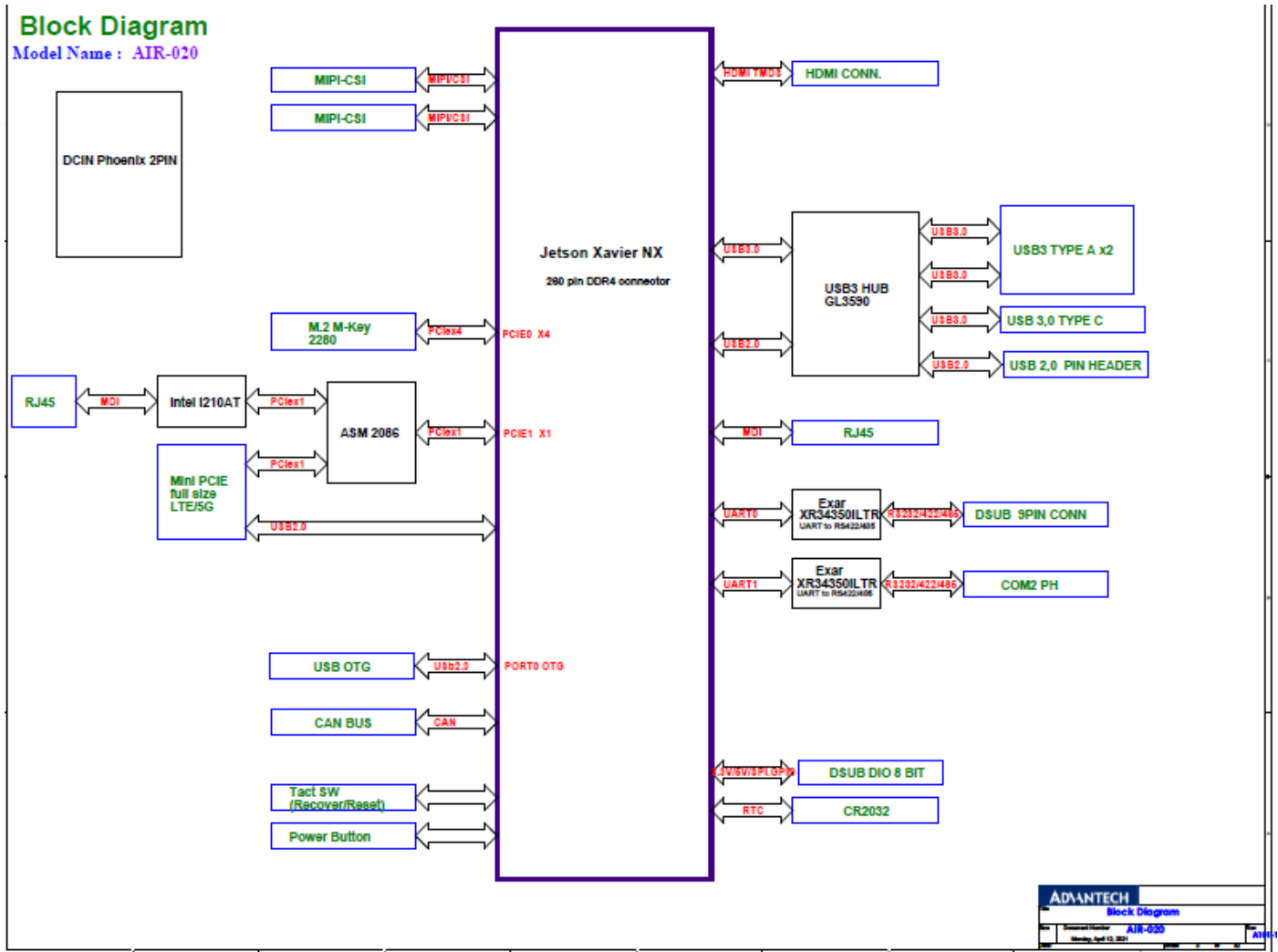
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Product Specification :

Block Diagram

Model Name : AIR-020



ADVANTECH	
Block Diagram	
Document Number	AIR-020
Version	1.0
Date	Monday, April 13, 2020

	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 Phoenix connector		
Working temp.	-20~60C w/ 0.7 m/s air flow		


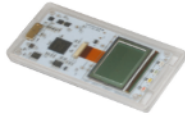




System Configuration :

Item.	Description.
Project Name.	AIR-020X AIR-020T AIR-020N
M/B Name	Jetson Xavier NX Jetson TX2 NX Jetson Nano
Carrier Board Model.	AIR-020
Carrier Version.	A101-1
CPU Model/Info	Six core Carmel ARM v8.2 Dual core Denver 2 and quad-core Arm® Cortex®-A57 processor complex Quad core ARM Cortex® A57
Memory Type/Info/Size	8GB 128bit LPDDR4 4GB 128bit LPDDR4
Graphic Controller	Volta 384 CUDA+ 48 Tensor cores Pascal 256 CUDA Maxwell 128 CUDA
LAN1 Controller	On chip GBE
LAN2 Controller	Intel I210AT
HDD Type/Info.	Flash 16GB of eMMC 5.1
Power Supply Model	DELTA ADP-60KD B OUTPUT 12.0V 5.0A 60W
Display Monitor	AUSU PA238Q 14" LCD display
Test OS Version	Ubuntu 18.04

Test Utility and Tool List :

Title	Version	Remark
burnin.sh	NA	

Test Equipment :

Model	Description
Advantech Power on/off test equipment (ATX/AT)	
PassMark USB3.0 Loopback Plug	
Serial Port cable for Transmission test	
COM RS232 Loopback Plug	
WLAN Access Point (Model. ASUS RT-AC66U Dual Band x3 802.11 AC Gigabit Router)	
CAN Bus Test Fixture. (Model. USBCAN-2E-U)	

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	GPIO Port Function	PASS	
1.09	CAN Bus Function	PASS	
1.10	Mini PCIe Basic Function	PASS	
1.11	MIPI-CSI Basic Function	PASS	
2	Hardware Compatibility		
2.01	Monitor Devices (HDMI) Compatibility	PASS	
2.02	USB Compatibility	PASS	
2.03	M.2 Devices Compatibility Test	PASS	
3	Reliability		
3.01	System Timer Function Test	PASS	
3.02	RTC Timer Function Test	PASS	
3.03	Power On/Off Test	PASS	
3.04	Reboot Test	PASS	
3.05	IO Port Stress Test	PASS	
3.06	Integrated Stress Test	PASS	

1. Function

1.01 Support Processor and Memory SPEC Check

1.01.01 Support CPU SPEC Test

1.01.01.0.1 Test Purpose :

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

1.01.01.0.2 Test Data:

Test Item	Description	Result	Remark
CPU SPEC Information Check	Jetson Xavier NX: Six Core Carmel ARMv8 Processor rev 0	PASS	
	Jetson TX2 NX: Dual Core Denver 2 and quad-core ARM Cortex-A57 Processor	PASS	
	Jetson Nano: Quad Core ARM A57	PASS	

1.01.02 Memory Specification Test

1.01.02.01.01 Test Purpose :

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

1.01.02.01.01 Test Data:

Test Item	Description	Result	Remark
Memory Spec. Check	8GB 128bit LPDDR4 (For Jetson Xavier NX)	PASS	
	4GB 128bit LPDDR4 (For Jetson TX2 NX/ Jetson Nano)	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	
	3840x2160, 60Hz (HDMI 2.0)	HDMI (HDMI1)	PASS	
	Max resolution (SPEC) check under Windows OS. <u>Max spec resolution:</u> => 3840x2160, 60Hz <u>Monitor Model and Fixture No.</u> => BenQ EL2870U 28"	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)	Read or Write. <u>Device Model and fixture No.</u> => XPG GAMMIX S50 1TB (EX-A01016: M.2 2280 PCIe Gen4x4 SSD)	NVME1	PASS	

1.03.02 eMMC Function Test

1.03.02.01.01 Test Purpose :

The test is to ensure the on-board eMMC is workable and maintained in a stable condition of eMMC functionality.

1.03.02.01.02 Test Data :

Test Item	Description	Location	Result	Remark
eMMC	Information check	SOM Module	PASS	
	OS boot		PASS	
	eMMC boot to OS for 10 times.		PASS	

1.04 USB Function**1.04.01 USB3.2 Gen1 x 2 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
USB3.2 type A Hot-plug function	USB 2.0 & 3.2 devices Hot-Plug test under OS. => Check on each USB3.1 ports. => USB2.0: SanDisk Cruzer Contour CZ8 16GB => USB3.0: Transcend JetFlash760 16GB => USB3.2: Type-C: SanDisk E80 500G (Type A/C)	USB3 (up/down)	PASS	
USB3.2 Type C-plug function	USB 3.2 Type-C device Hot-Plug test under OS. => Check on each USB3.2 ports. => USB2.0: SanDisk Cruzer Contour CZ8 16GB => USB3.0: Transcend JetFlash760 16GB => USB3.2: Type-C: SanDisk E80 500G (Type A/C)	USB Type-C	PASS	
USB function	R/W USB2.0 /USB3.2 Devices => Check on one USB3.2 port of each USB3.2 controller. => USB2.0: SanDisk Cruzer Contour CZ8 16GB => USB3.0: Transcend JetFlash760 16GB => USB3.2: Type-C: SanDisk E80 500G (Type A/C)	USB3 (up/down)/ 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.	LAN12 (Left)	PASS	
	Ping IP:192.168.11.1 for 5 minutes	LAN12 (Right)	PASS	

1.05.02 LAN LED Indicators Function Test

1.05.02.01.01 Test Purpose :

The purpose of this test is to examine the functional of the LAN LED.

1.05.02.01.02 Test Data :

Test Item	Description	Location	Result	Remark
LAN Indicator LED Checks	Right Side (LED1) Green LED ON for Link On. Green LED blinking for Active.	LAN12	PASS	
	Left Side (LED2) LED Off for 10Mbps, LED Off for 100Mbps Orange LED ON for 1Gbps.	LAN12	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 burnin.sh test program to send message from TX to RX to make sure com port function properly (TX2/NANO only COM1)	COM1/ COM2	PASS	

Test Item	Description	Location	Result	Remark
RS-422 Function	Use burnin.sh test program to send message from DUT1 to DUT2 make sure com port function properly (terminal set off) (TX2/NANO only COM1)	COM1/ COM2	PASS	
RS-485 Function	Use burnin.sh test program to send message from DUT1 to DUT2 make sure com port function properly (terminal set off) (TX2/NANO only COM1)	COM1/ 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 GPIO Port Function

1.08.01.01.01 Test Purpose :

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

1.08.01.01.02 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	

1.09 CAN Bus Function

1.09.01.01.01 Test Purpose :

The purpose of this test is to examine the CAN bus function.

1.09.01.01.02 Test Data :

Test Item	Description	Location	Result	Remark		
CAN Bus Connect Function Test.	Connect the CAN Bus test device and run the test program to examine connector function.	CAN(CN1)	PASS			
CAN port to CAN port between 2 DUTs with 30m cable						
DUT 1 CAN Bus Port send to DUT 2 CAN Bus Port	Bus Speed	1000kbps	Interval: 10ms	CAN(CN1)	PASS	
DUT CAN to USBCAN-2E-U with 30m cable						
CAN Bus Port	Bus Speed	1000kbps	Interval: 10ms	CAN(CN1)	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	100MB file(s) read/write function check. (Please connect to Hinet for test. http://speed.hinet.net/httpptest.htm) *No CRC check test needed for the download file. Or Please connect to below links to test.\\192.168.11.200\File_Read_Write	MINI_PCIE1	PASS	
	Mini-PCIE Card: => EWM-W189H02E(WIFI)			
	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. Hardware Compatibility

2.01 Monitor Devices (HDMI) Compatibility

2.01.01.01.01 Test Purpose :

The purpose of this test is to validate and ensure the monitors compatibility of the DUT.

2.01.01.01.02 Test Data :

HDMI Monitor

Vendor	Model	HDMI_Type	HDMI/ HDMI-HML_Interface	Maximum Resolution/Hz_(HDMI)	ADVANTECH P/N	Result	Remark
ASUS	VP28UQG	2.0	HDMI	3840X2160 @60	N/A	PASS	
BenQ	EL2870U	2.0	HDMI	3840X2160 @60	N/A	PASS	

2.02 USB Compatibility

2.02.01.01.01 Test Purpose :

The purpose of this test is to validate and ensure the USB devices Compatibility of DUT.

2.02.01.01.02 Test Data :

Category	Capacity	Vendor	Model	ADVANTECH P/N	Bandwidth_Performance	Result	Remark
Flash Disk	128GB	SanDisk	TAD-SDCZ60	N/A	USB2.0	PASS	
Flash Disk	32GB	Apacer	AP32GAH322B-1	N/A	USB2.0	PASS	
Flash Disk	64GB	SanDisk	SDDDC2-064G-G46	N/A	USB3.2 Gen1x1(USB3.0)	PASS	USB Type-C
Flash Disk	64GB	Toshiba	U301	N/A	USB3.2 Gen1x1(USB3.0)	PASS	
Flash Disk	64GB	Transcend	JetFlash 760	N/A	USB3.2 Gen1x1(USB3.0)	PASS	
External HDD	500GB	SanDisk	E80	N/A	USB3.2 Gen2x1(USB3.1)	PASS	USB Type-C/ /Type A
External HDD	500GB	ADATA	SE800	N/A	USB3.2 Gen2x1(USB3.1)	PASS	USB Type-C/ /Type A

2.03 M.2 Devices Compatibility Test

2.03.01.01.01 Test Purpose :

The purpose of this test is to validate and ensure the M.2 Cards Compatibility of DUT.

2.03.01.01.02 Test Data :

Dimension	Interface	Bandwidth Performance	Category	Vendor	Model	ADVANTECH P/N	Result	Remark
2280	M.2 Key M	PCIe v4.0	NVMe PCIe SSD	ADATA	XPG GAMMIX S50 1TB	NA	PASS	
2280	M.2 Key M	PCIe v3.0	NVMe PCIe SSD	Advantech	SQF-C8MV2- 128GCEDC	SQF-C8MV2- 128GCEDC	PASS	
2280	M.2 Key M	PCIe v3.0	NVMe PCIe SSD	LITE-ON	CA3-8D512	96FD80-P512-LIS	PASS	
2280	M.2 Key M	PCIe v3.0	NVMe PCIe SSD	Samsung	SM951-NVMe-128G (MZVPV128HDGM)	N/A	PASS	
2280	M.2 Key M	PCIe v3.0	NVMe PCIe SSD	Advantech	S1TR19117601000002	SQF-CM8V4- 960G-ECE	PASS	

3 Reliability

3.01 System Timer Function Test

3.01.01.01.01 Test Purpose :

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

3.01.01.01.02 Test Data :

Test Item	Description	Result	Remark
System Timer	System time must $\leq +2$ sec/24 hours under room temperature.	PASS	$\pm 0s$

3.02 RTC Timer Function Test

3.02.01.01.01 Test Purpose :

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

3.02.01.01.02 Test Data :

Test Item	Description	Result	Remark
RTC Timer	RTC time must $\leq +2$ sec/24 hours under room temperature.	PASS	$\pm 0s$

3.03 Power On/Off Test

3.03.01.01.01 Test Purpose :

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

3.03.01.01.02 Test Data :

Test Item	Description	Result	Remark
Power ON/OFF Test	ATX Mode. Power ON/OFF test. Motherboard ATX/AT Jumper setting at "ATX" Mode. PASS criteria ≥ 1000 loops, booting rate=100%	PASS	

3.04 Reboot Test

3.04.01.01.01 Test Purpose :

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

3.04.01.01.02 Test Data :

Test Item	Description	Result	Remark
Auto Reboot Test	ATX Mode. Power ON/OFF test. Motherboard ATX/AT Jumper setting at "ATX" Mode. PASS criteria ≥ 1000 loops, booting rate=100%	PASS	

3.05 IO Port Stress Test

3.05.01.01.01 Test Purpose :

The purpose of this test is to examine and validate the stability of the IO port.

3.05.01.01.02 Test Data :

Test Item	Description	Result	Remark
COM1,COM2	<ol style="list-style-type: none"> The platform must pass the Serial Port stress test over 12 hours. The platform MUST maintain a stable condition after the test has been completed. 	PASS	
RS485	<ol style="list-style-type: none"> The platform must pass the Serial Port stress test over 12 hours. The platform MUST maintain a stable condition after the test has been completed. *Cable Length: 1200M	PASS	
CAN Bus	<ol style="list-style-type: none"> The platform must pass the CAN bus stress test over 12 hours. The platform MUST maintain a stable condition after the test has been completed. *Test with USBCAN-2E-U (USB to Can bus), PE-A00565	PASS	

3.06 Integrated Stress Test

3.06.01.01.01 Test Purpose :

The purpose of this test is to examine the Full Load performance and to ensure the quality and stability of the System.

3.06.01.01.02 Test Data :

Test Item	Description	Result	Remark
IO Stress Test	GPU/LAN2/COM: The platform must pass the stress test over 12 hours. And MUST maintain a stable condition after the test has been completed. *Test by burnin.sh program	PASS	
	CPU/GPU/LAN1: The platform must pass the stress test over 12 hours. And MUST maintain a stable condition after the test has been completed. *Test by burnin.sh program	PASS	
	CPU/Memory/H pattern: The platform must pass the stress test over 12 hours. And MUST maintain a stable condition after the test has been completed. *Test by burnin.sh program	PASS	