DS-011
EVT Function
Test Report

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Revision History：

Date	Revision	Description	Creator
2025/06/25	1.0	Initial version	Johnny Wang

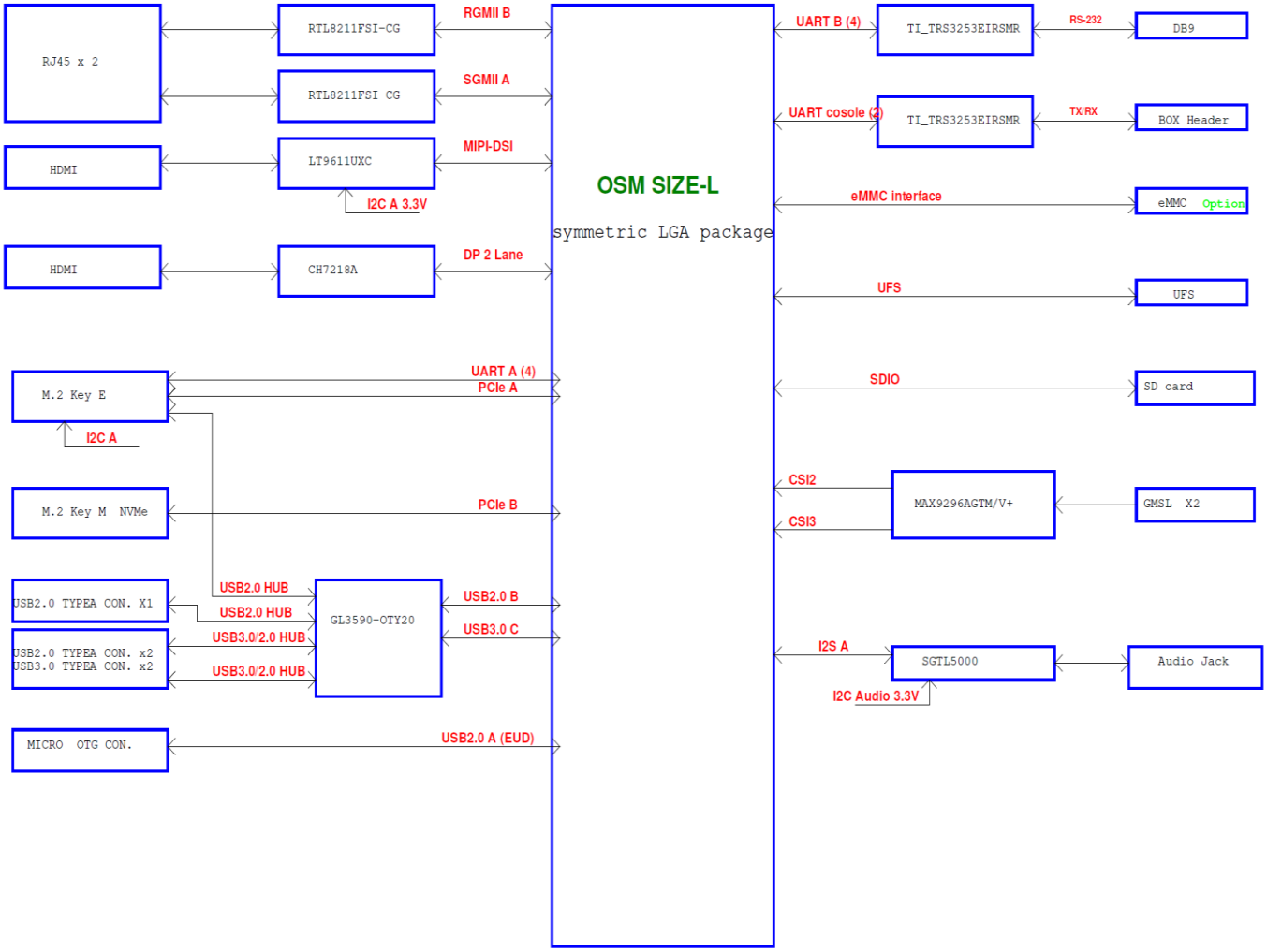
Table of Contents

Chapter 1：General

1.01 Product Specification：

Board Spec.		
		Description
Form Factor		Qualcomm QCS6490/5430
Board Size		
CPU	Socket	OSM
	Type	Qualcomm QCS6490/5430
	TDP	8W~10W
Chipset	PCH	N/A
Memory	Channel	Dual Channel
	Type	4 + 4GB onboard
	DDR	8533MT/s
	Max Memory	8GB
External I/O features	Display Out	HDMI 2.1 TMDS *2
	USB Port	USB 3.2 x Gen1, *2 ; 1 USB-C for Software Download mode.
	Ethernet Port	2 x RJ45
	Audio	1 x audio jack for Line-out/ Mic-in
	GMSL	2 x GMSL Conn. (Option)
	SD	1 x Micro SD
	Serial Ports	1 x RS-232 (4 wires), 1 Debug Console
	Button	Power
Internal I/O features	Expansion	1x M.2 2230 E Key (BOM Option) 1x M.2 3042 B Key LTE 1 x M.2 2280 M Key for NVME
	Storage	M.2 2280
Additional Requirements	Proof-of Play	
	Watch Dog Timer (WDT)	Yes
	Board layer	12
Power		12~24V , Mainly 19V65W,

Block Diagram



1.02 System Configuration：(Driver & firmware version)

Item.	Description.	Item.	Description.
Project Name.	DS-011	**PCB Version.**	A101-1
M/B No	AKS0252718 AKS0251503	**Kernel Version.**	Linux qcs6490aom2721a1 6.6.28-debug-01890-g350dfd604d2f-dirty #1 SMP PREEMPT Wed Jun 19 20:29:11 UTC 2024 aarch64 aarch64 aarch64 GNU/Linux
SPI Version.	BOOT.MXF.1.0.c1-00134-KODIAKLA-2	**OS Image Version.**	aom2721a1_yl01101_k0606028_q6490_08g
CPU Model/Info	Qualcomm QCS6490 1x A78 @ 2.7 GHz, 3x A78 @ 2.4 GHz, 4x A55 @ 1.9 GHz		
Memory Type/Info	On-board DDR5	**Total Memory Size**	8 GB
WLAN/BT Device	AIW-170BQ	**4G Device**	EWM-C401CQE01
Output Display Type	HDMI	**AC/DC Adaptor Model**	FSB036-RBBN2

1.03 Testing Software and Equipments

Testing software：

Test Program	Version / Description
memtester	Memory test
dd	Storage Read/Write test
Echo	Serial Port test
Iperf	WLAN test, LAN test
hwclock, date	RTC test
boottimes	Reboot test
Stress-ng	Cpu burn-in test

Test Equipments：

Model	Description
Power on/off test equipment (ATX/AT)	
WLAN Access Point (Model.ASUS Gigabit RT-N66U)	● 802.11b/g/n- ● d2.0 2.4/5-GHz Mod Auto AP; ● 6 RP-TNC; ● FCC 
TECPEL Digital Multi Meter (Model. DMM 8050)	● DMM-8050: ● True RMS. ● 19.999 count LCD display. ● 0.05% DC V accuracy. ● High voltage to 1,000 DC and 750V AC. ● 20A DC/AC current range and 20MΩ. ● Frequency measurement. ● Data hold. ● Logic test. ● Duty cycle measurement. ● Drop-proof to 10ft. ● Overload protection. ● Meet IEC-348 and UL-1244 standard. 

1.04 Test Results Definition：

Criteria	Definition
PASS	Test result pass and function work perfectly.
Fail	Test fail or can not meet the spec requirement.
Limitation	There are no plans to fix this erratum.
Skip	Test can not execute due to no test program, driver or test device.
N/A	Spec not support or driver not ready.
Note	Reference Data

1.05 Test Results Summary：

Num.	Test Item	Result	Remark
Chapter.2	**System function Test**		
2.01	CPU	**PASS**	
2.02	Memory	**PASS**	
2.03	Storage Device	**PASS**	
2.04	USB	**PASS**	
2.05	Video Display	**PASS**	
2.06	Audio Function	**PASS**	
2.07	Ethernet Function	**PASS**	
2.08	COM Port Function	**PASS**	
2.09	RTC	**PASS**	
2.10	Watchdog Function	**PASS**	
2.11	M.2 Function	**PASS**	
2.12	GMSL Function	**PASS**	
2.13	Button Function	**PASS**	
Chapter.3	**Performance Test**		
3.01	SD Performance	**PASS**	
3.02	USB Performance	**PASS**	
3.03	On-board storage Performance	**PASS**	
3.04	Ethernet Performance	**PASS**	
Chapter.4	**System Compatibility Test**		
4.01	SD Compatibility	**PASS**	
4.02	USB Compatibility	**PASS**	
Chapter.5	**Reliability Test**		
5.01	System On/Off Test	**PASS**	
5.02	CPU Burinin Test	**PASS**	
5.03	Memory Burinin Test	**PASS**	
5.04	COM Port Stress Test	**PASS**	
5.05	LAN Stress Test	**PASS**	

Chapter 2：System function test

2.01 CPU

2.01.1.01 Test Purpose:

The test ensures that the function of the CPU tallies with the CPU specification.

2.01.1.02 Test Tool or Equipment:

1. USB to serial RS232 cable
2. RS232 cable

2.01.1.03 Testing Configuration:

1. Test environment: Room temperature

2.01.1.04 Test Procedure:

1. Press any key to enter U-Boot when device Power-up. Check CPU info in U-Boot log.
2. Boot into OS, check the processor info under OS
   # cat /proc/cpuinfo
3. Check CPU frequency.
   # cat /sys/devices/system/cpu/cpu0/cpufreq/cpuinfo_max_freq
   # cat /sys/devices/system/cpu/cpu0/cpufreq/cpuinfo_cur_freq

2.01.1.05 Test Result:

Item	Criteria	Result	Notes
OS CPU info	Check the CPU information is correct	**PASS**	
CPU frequency		**PASS**	

2.02 Memory

2.02.1.01 Test Purpose：

The test ensures that the function of the Memory tallies with the Memory specification.

2.02.1.02 Test Tool or Equipment:

1. USB to serial RS232 cable
2. RS232 cable

2.02.1.03 Testing Configuration:

1. Test environment: Room temperature

2.02.1.04 Test Procedure:

1. Press any to enter U-Boot when device Power-up. Check DRAM info in U-Boot log.
2. Boot into OS. Check memory info.

   # cat /proc/meminfo

2.02.1.05 Test Result:

Item	Criteria	Result	Notes
U-Boot DRAM Check	Memory Capacity information is correct	**PASS**	
OS memory info	Memory Capacity information is correct	**PASS**	

2.03 Storage Device

2.03.1 SD Card

2.03.1.01 Test Purpose：

Evaluate whether the SD is workable and maintained in a stable condition when working at reading and writing.

2.03.1.02 Test Tool or Equipment:

1. USB to serial RS232 cable
2. RS232 cable

2.03.1.03 Testing Configuration:

1. Test environment: Room temperature

2.03.1.04 Test Procedure:

1. Power on the device and boots into OS
2. Check the space of SDcard.
   # fdisk –l /dev/mmcblk1
3. Mount SDcard.
   # mkdir /mnt/sdcard
   # mount /dev/mmcblk1p1 /mnt/sdcard
4. Run command to read/write 1G file on SD card. Record the read/write speed in Notes below.
   # dd if=/dev/zero of=/mnt/sdcard/testFile bs=1M count=1000
   # dd if=/mnt/sdcard/testFile of=/dev/zero bs=1M
5. Enable the write protect on SD card, verify the SD card can mount and read, but can’t write files on it.
6. Un-mount SD card. Re-insert SD card 5 times, mount again and check read/write function.
   # umount /mnt/sdcard
   # mount /dev/mmcblk1p1 /mnt/sdcard
7. Check SD card read/write function after reboot / wakeup.

(SD card could be located at /dev/mmcblk0 , /dev/mmcblk1, check with RD first)

2.03.1.05 Test Result:

Item	Criteria	Result	Notes
MicroSD Card	The capacity of the MicroSD card is correct.	**PASS**	
	Read/Write test 1G file to check the MicroSD card function can work properly.	**PASS**	
	The MicroSD card can read/write after re-insert.	**PASS**	
	The MicroSD card can read/write after reboot.	**PASS**	

2.03.2 On-board Storage

2.03.2.01 Test Purpose：

The purpose of this test is to examine the functional of the on-board storage.

2.03.2.02 Test Tool or Equipment:

1. USB to serial RS232 cable
2. RS232 cable

2.03.2.03 Testing Configuration:

1. Test environment: Room temperature

2.03.2.04 Test Procedure:

1. Power on the device and boots into OS by on-board storage.
2. Check the space of on-board storage.
   # fdisk –l /dev/mmcblk0
3. Run command to read/write 1G file on on-board storage. Record the read/write speed in Notes below.
   # mkdir /mnt/nand
   # mount /dev/mmcblk0p1 /mnt/sdcard //if OS boot from SD card, need to mount on-board storage
   # dd if=/dev/zero of=/mnt/nand/testFile bs=1M count=1000
   # dd if=/mnt/nand/testFile of=/dev/zero bs=1M
4. Check on-board storage read/write function after reboot / wakeup.

(NAND flash could be located at /dev/mmcblk0, /dev/mmcblk1, check with RD first)

2.03.2.05 Test Result:

Item	Criteria	Result	Notes
eMMC	The capacity of on-board storage is correct	**PASS**	
	No error to read/write the on-board storage.	**PASS**	
	Read/write after reboot	**PASS**	
UFS	The capacity of on-board storage is correct	**PASS**	
	No error to read/write the on-board storage	**PASS**	
	Read/write after reboot	**PASS**	

2.04 USB

2.04.1 USB mass storage

2.04.1.01 Test Purpose：

The purpose of this test is to ensure the functional of the USB port.

2.04.1.02 Test Tool or Equipment:

1. USB to serial RS232 cable
2. RS232 cable
3. USB Storage

2.04.1.03 Testing Configuration:

1. Test environment: Room temperature

2.04.1.04 Test Procedure:

1. Power on the device and boots into OS
2. Plug in a USB flash device into USB connector and check system can detect it.
3. Run command to read/write 1G file on USB flash. Record the read/write speed in Notes below.
   # mkdir /mnt/usb
   # mount /dev/sda1 /mnt/usb
   # dd if=/dev/zero of=/mnt/usb/testFile bs=1M count=1000
   # dd if=/mnt/usb/testFile of=/dev/zero bs=1M
4. Un-mount USB disk. Re-insert USB flash 5 times. Mount USB again and and check read/write function.
   # umount /mnt/usb
   # mount /dev/mmcblk1p1 /mnt/usb
1. Check USB read/write function after reboot / wakeup.

(USB could be located at /dev/sda0 , /dev/sda1, check with RD first)

(If dd command does not show read/write speed, use “time dd …” to measure the time.)

2.04.1.05 Test Result:

Item	Criteria	Result	Notes
USB3.2_1	System should detect the USB flash device.	**PASS**	
	Read/Write test 1G of data file to check the USB function can work properly.	**PASS**	
	USB can read/write after re-insert 5 times.	**PASS**	
	USB can read/write after reboot	**PASS**	
USB3.2_2	System should detect the USB flash device.	**PASS**	
	Read/Write test 1G of data file to check the USB function can work properly.	**PASS**	
	USB can read/write after re-insert 5 times.	**PASS**	
	USB can read/write after reboot	**PASS**	

2.05 Video Display

2.05.1 HDMI

2.05.1.01 Test Purpose：

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

2.05.1.02 Test Tool or Equipment:

1. USB to serial RS232 cable
2. LCD Monitor BenQ EL-2870B 28” 3840 X 2160

2.05.1.03 Testing Configuration:

1. Test environment: Room temperature

2.05.1.04 Test Procedure:

1. Use HDMI cable to connect HDMI Monitor
2. Power on device and boot to OS.
3. Check HDMI function after reboot.

2.05.1.05 Test Result:

Item		Criteria	Result	Notes
HDMI1	4K2KP30 3840x2160@30P	1. There is no shivering. 2. There is no water ripple 3. There is no color error 4. There is no flicker	**PASS**	
			PASS	
	HDMI-Audio Function	check if the voice is from HDMI device	**PASS**	
	Cable Hot-Plug checks under OS for 5 times.		**PASS**	
	Function after reboot		**PASS**	
HDMI2	4K2KP60 3840x2160@60P	1. There is no shivering. 2. There is no water ripple 3. There is no color error 4. There is no flicker	**PASS**	
			PASS	
	Cable Hot-Plug checks under OS for 5 times.		**PASS**	
	Function after reboot		**PASS**	

2.06 Audio Function

2.06.1 Line-out test

2.06.1.01 Test Purpose：

Evaluate whether the Line-out port are workable and maintained in a stable condition.

2.06.1.02 Test Tool or Equipment:

1. USB to serial RS232 cable
2. Earphone

2.06.1.03 Testing Configuration:

1. Test environment: Room temperature

2.06.1.04 Test Procedure:

1. Turn on the power and boot to OS.
2. Connect the earphone with combo audio jack.
3. Play a media file to check if the audio is working properly and no errors occur.
4. Check audio function after reboot.

2.06.1.05 Test Result:

Item		Criteria	Result	Notes
Line-out (Speaker)	Left	1. The function can work and no error. 2. No any noise in silent mode.	**PASS**	
	Right		**PASS**	
	Reboot	Function after reboot	**PASS**	

2.06.2 Mic-in test

2.06.2.01 Test Purpose：

Evaluate whether the Mic-in port are workable and maintained in a stable condition.

2.06.2.02 Test Tool or Equipment:

1. USB to serial RS232 cable
2. RS232 cable
3. Microphone

2.06.2.03 Testing Configuration:

1. Test environment: Room temperature

2.06.2.04 Test Procedure:

1. Do not connect a microphone to Mic-in. Recording without input sound source.
2. Play recorded file. There should be no noise.
3. Connect audio line from MIC-in to other PC's line-out, which plays music for recording.
4. Recording through MIC-in input.
5. Play recorded file. The sound should be recorded clearly.
6. Check audio function after reboot.

2.06.2.05 Test Result:

Item	Criteria	Result	Notes
Mic-in	1. Recording without microphone, there should be no noise.	**PASS**	
	2. Record the music from MIC-in should be clear and no distortion.	**PASS**	
	Function after reboot	**PASS**	

2.07 Ethernet Function

2.07.1 LAN Basic Function test

2.07.1.01 Test Purpose：

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

2.07.1.02 Test Tool or Equipment:

1. USB to serial RS232 cable
2. LAN Cable (Cat.5E length:3m)

2.07.1.03 Testing Configuration:

1. Test environment: Room temperature

2.07.1.04 Test Procedure:

1. Turn on the power and boot to OS.
2. Connect Client (DUT) to internet with dhcp.

2.07.1.05 Test Result:

Item	Method	Criteria	Result	Notes
LAN0	Ping 8.8.8.8	There is no error by test	**PASS**	
LAN1			**PASS**	

2.07.2 LAN speed and LED check

2.07.2.01 Test Purpose：

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

2.07.2.02 Test Tool or Equipment:

1. USB to serial RS232 cable
2. LAN Cable (Cat.5E length:3m)

2.07.2.03 Testing Configuration:

1. Test environment: Room temperature

2.07.2.04 Test Procedure:

1. Connect LAN cable from LAN port of DUT to SmartBits
2. Turn on DUT, boot into OS.
3. Using follow comman to test LED status.

   # ethtool -s eth0 speed 10 duplex full autoneg on //10m

   # ethtool -s eth0 speed 100 duplex full autoneg on //100m

   # ethtool -s eth0 speed 1000 duplex full autoneg on //1000m

2.07.2.05 Test Result:

Board LED			Criteria		Result		Notes
			Color	Status	Color	Status	
LAN0	Left	Speed LED-10 Mbps	Off	Off	**PASS**	**PASS**	
		Speed LED-100 Mbps	Orange	On	**PASS**	**PASS**	
		Speed LED-1000 Mbps	Green	On	**PASS**	**PASS**	
	Right	Activity LED	Green	Blink	**PASS**	**PASS**	
		Link LED	Green	On	**PASS**	**PASS**	
LAN1	Left	Speed LED-10 Mbps	Off	Off	**PASS**	**PASS**	
		Speed LED-100 Mbps	Orange	On	**PASS**	**PASS**	
		Speed LED-1000 Mbps	Green	On	**PASS**	**PASS**	
	Right	Activity LED	Green	Blink	**PASS**	**PASS**	
		Link LED	Green	On	**PASS**	**PASS**	

2.08 COM Port Function

2.08.1 Debug Console

2.08.1.01 Test Purpose：

The purpose of this test is to examine the Console Port basic function.

2.08.1.02 Test Tool or Equipment:

1. USB to serial RS232 cable
2. RS232 cable
3. RS232 loopback testing fixture.

2.08.1.03 Testing Configuration:

1. Test environment: Room temperature

2.08.1.04 Test Procedure:

1. Connect the USB to serial RS232 cable to the PC.
2. Connect the RS232 cable to the COM port on the DUT.
3. Set terminal program as 115200bps, 8, n, 1 on the PC.
4. Power on the device and boots into OS.
5. Check the PC terminal shows the DUT power log. User can input command and get response from debug console port.
6. Check the debug port function after reboot.

2.08.1.05 Test Result:

Item	Criteria	Result	Notes
Debug Port COMA Test	The window of terminal program should display EUT POST.	**PASS**	
Reboot	Function after reboot.	**PASS**	

2.08.2 RS232

2.08.2.01 Test Purpose：

The purpose of this test is to examine the Serial Port basic function.

2.08.2.02 Test Tool or Equipment:

1. USB to serial RS232 cable
2. RS232 cable
3. Advantech RS232 loopback testing fixture.

2.08.2.03 Testing Configuration:

1. Test environment: Room temperature

2.08.2.04 Test Procedure:

1. Turn on the power and boot to OS.
2. Connect RS232 loopback testing fixture to COM port.
3. Run command to test loopback function

   # stty -F /dev/ttymxc1 -echo -onlcr 115200 crtscts

   # cat /dev/ttymxc1 &

   # echo "Serial Port Test" > /dev/ttymxc1

2.08.2.05 Test Result:

Port.	Item	Baud Rate	Criteria	Result	Note
COM1	Loopback Test	9600bps	Lookback test shouldn't have any error.	**PASS**	
		19200bps		**PASS**	
		38400bps		**PASS**	
		57600bps		**PASS**	
		115200bps		**PASS**	
	Function after reboot	115200bps	The COM PORT Port can work normally after reboot	**PASS**	
COM2	Loopback Test	9600bps	Lookback test shouldn't have any error.	**PASS**	
		19200bps		**PASS**	
		38400bps		**PASS**	
		57600bps		**PASS**	

		115200bps		**PASS**	
	Function after reboot	115200bps	The COM PORT Port can work normally after reboot	**PASS**	
COM3	Loopback Test	9600bps	Lookback test shouldn't have any error.	**PASS**	
		19200bps		**PASS**	
		38400bps		**PASS**	
		57600bps		**PASS**	
		115200bps		**PASS**	
	Function after reboot	115200bps	The COM PORT Port can work normally after reboot	**PASS**	

2.09 RTC

2.09.1.01 Test Purpose：

Evaluate whether the RTC functions are working and are maintained in a stable condition.

2.09.1.02 Test Tool or Equipment:

1. USB to serial RS232 cable
2. SD Card

2.09.1.03 Testing Configuration:

1. Test environment: Room temperature

2.09.1.04 Test Procedure:

1. Power on EUT and boots into OS with network connected
2. Calibrate the system timer and hwclock setting the same as Taiwan Standard Time. (Call ChungHwa Telecom #117 to correct the timer.)
3. Check the System Timer and hwclock after 24 hours.

2.09.1.05 Test Result:

Item	Criteria	Result	Notes
Calibrate RTC Timer	The timer should work properly no any deviation for 3 times.	**PASS**	
Power on 24 hours (no network)	Inaccuracy ≦ ±2sec/day	**PASS**	
Power off 24 hours		**PASS**	

2.10 Watchdog Function

2.10.1.01 Test Purpose：

Examine the Watchdog function and Hardware Watchdog jumper can work properly

2.10.1.02 Test Tool or Equipment:

1. USB to serial RS232 cable

2.10.1.03 Testing Configuration:

1. Test environment: Room temperature

2.10.1.04 Test Procedure:

1. Watchdog Function Test Data
2. echo c > /proc/sysrq-trigger

2.10.1.05 Test Result:

Item	Criteria	Result
Watchdog Timer Function	The system will reboot after the system crash about 6 seconds	**PASS**

2.11 M.2 Function

2.11.1.01 Test Purpose：

Evaluate whether the PCI-Ex1 slot function are workable and maintained in a stable condition

2.11.1.02 Test Tool or Equipment

1. USB to serial RS232 cable
2. RS232 Cable
3. M.2 E Key Wireless LAN and Bluetooth Module Card (AIW-170BQ)
4. M.2 M Key Nvme SSD (Advantech 96FD80-P256-AH, QE.NO: EX-A01381)
5. M.2 B Key4G LTE Module Card (Advantech EWM-C401CQE01, QE.NO: EX-A01388)
6. 4G SIM Card (QE.NO: PE-A00314)

2.11.1.03 Testing Configuration:

1. Test environment: Room temperature

2.11.1.04 Test Procedure:

(For WLAN type device)

1. Install the M.2 card.
2. Boot up the system with the test device.
3. Examine the functionality of the test device.
4. Establish an Internet link by connecting to an effective wireless access point.
5. The system must always maintain a stable condition without any system crash, hang, blue screen, restart or any other problems.

(For Storage type M.2 device)

1. Insert M.2 device into DUT.
2. Boot into OS check M.2 can be detected with correct information.

(For Bluetooth type device)

3. Establish the bluetooth connection with others of BT devices.
4. Examine the BT devices function.

(For 4G/LTE)

5. Established the 4G network links. Then check the link status devices function.
6. Examine the SIM Card can be detected.
7. Surf on the internet and download some files to check the link stability.

2.11.1.05 Test Result:

Test Item	Description	Location	Result	Remark
M.2 E Key	WIFI Test Device: AIW-170BQ	**M2_E**	**PASS**	
	Bluetooth Test Device: AIW-170BQ	**M2_E**	**PASS**	
M.2 B Key	4G device Test Device: EWM-C401CQE01	**M2_B**	**PASS**	
M.2 M Key	Nvme device Test Device: Advantech 96FD80-P256-AH	**M2_M**	**PASS**	

2.12 GMSL Function

2.12.1.01 Test Purpose：

Evaluate whether the GMSL function are workable and maintained in a stable condition.

2.12.1.02 Test Tool or Equipment:

1. USB to serial RS232 cable
2. RS232 cable
3. MIPI CSI-2 Camera module

2.12.1.03 Testing Configuration:

1. Test environment: Room temperature

2.12.1.04 Test Procedure:

1. Connect camera module to DUT .
2. Turn on power and boot to OS
3. Check the camera preview function is workable.

2.12.1.05 Test Result:

Item	Criteria	Result	Notes
GMSL1	The camera preview function can work and no error.	**PASS**	
GMSL2		**PASS**	

2.13 Button Function

2.13.1.01 Test Purpose：

Evaluate whether the button function are workable and maintained in a stable condition.

2.13.1.02 Test Tool or Equipment:

1. USB to serial RS232 cable
2. RS232 cable

2.13.1.03 Testing Configuration:

1. Test environment: Room temperature

2.13.1.04 Test Procedure:

1. Press the Power Button to start up the system. And examine the Power LED status.
2. Press the Power button again to make the system shut down.
3. Press the Power Button to start up the system. And press the Reset button to make the system reset.

2.13.1.05 Test Result:

Test Item	Criteria	Result	Notes
Power Button	Press the Power Button to start up the system. Press the Power Button to make the system shut down	**PASS**	
Reset Button	Press the Power Button to start up the system. And press the Reset button to make the system reset	**PASS**	
Power LED	Power LED is "ON" when system power on.	**PASS**	

Chapter 3： Performance Test

3.01 SD Performance

3.01.1.01 Test Purpose：

The purpose of this test is to validate and ensure the SD card performance of the DUT.

3.01.1.02 Test Tool or Equipment:

1. USB to serial RS232 cable
2. Memory SD card

3.01.1.03 Testing Configuration:

1. Test environment: Room temperature

3.01.1.04 Test Procedure:

1. Run command

   # dd if=/dev/zero of=/mnt/sdcard/testFile bs=1M count=1000

   # dd if=/mnt/sdcard/testFile of=/dev/zero bs=1M

(If dd command does not show read/write speed, use “time dd …” to measure the time.)

3.01.1.05 Test Result:

Item	Criteria	Result	Notes
MircoSD Card	Read 1 GB transferred 13.5947 s, 77.1 MB/s	**PASS**	
	Write 1 GB transferred 20.115 s, 52.1 MB/s	**PASS**	

3.02 USB Performance

3.02.1.01 Test Purpose：

The purpose of this test is to validate and ensure the usb performance of the DUT.

3.02.1.02 Test Tool or Equipment:

3. USB to serial RS232 cable
4. Memory SD card

3.02.1.03 Testing Configuration:

2. Test environment: Room temperature

3.02.1.04 Test Procedure:

2. Run command

   # dd if=/dev/zero of=/mnt/sdcard/testFile bs=1M count=1000

   # dd if=/mnt/sdcard/testFile of=/dev/zero bs=1M

(If dd command does not show read/write speed, use “time dd …” to measure the time.)

3.02.1.05 Test Result:

Item	Criteria	Result	Notes
USB3.2_1	Read 1 GB transferred 10.9797 s, 95.5 MB/s	**PASS**	
	Write 1 GB transferred 23.6135 s, 44.4 MB/s	**PASS**	
USB3.2_2	Read 1 GB bytes transferred 12.9479 s, 81.0 MB/s	**PASS**	
	Write 1 GB bytes transferred 24.8627 s, 42.2 MB/s	**PASS**	

3.03 On-board storage Performance

3.03.1.01 Test Purpose：

The purpose of this test is to validate and ensure the usb performance of the DUT.

3.03.1.02 Test Tool or Equipment:

1. USB to serial RS232 cable

3.03.1.03 Testing Configuration:

1. Test environment: Room temperature

3.03.1.04 Test Procedure:

1. Power on the device and boots into OS by the NAND flash.
2. Run the command to test.

   # mkdir /mnt/nand

   # mount /dev/mmcblk0p2 /mnt/nand

   # dd if=/dev/zero of=/mnt/nand/testFile bs=1M count=1000

   # dd if=/mnt/nand/testFile of=/dev/zero bs=1M

   (If dd command does not show read/write speed, use “time dd …” to measure the time.)

3.03.1.05 Test Result:

Item	Criteria	Result	Notes
eMMC	Read 1048576000 bytes (1.0 GB, 1000 MiB) copied, 3.46566 s, 303 MB/s	**PASS**	
	Write 1048576000 bytes (1.0 GB, 1000 MiB) copied, 1.11612 s, 939 MB/s	**PASS**	
UFS	Read 1048576000 bytes (1.0 GB, 1000 MiB) copied, 1.06791 s, 982 MB/s	**PASS**	
	Write 1048576000 bytes (1.0 GB, 1000 MiB) copied, 0.663215 s, 1.6 GB/s	**PASS**	

3.04 Ethernet Performance

3.04.1.01 Test Purpose：

The purpose of this test is to validate and ensure the Ethernet performance of the DUT.

3.04.1.02 Test Tool or Equipment:

1. USB to serial RS232 cable
2. Memory SD card

3.04.1.03 Testing Configuration:

1. Test environment: Room temperature

3.04.1.04 Test Procedure:

1. Turn on the power and boot to OS.
2. Connect Iperf Server and Client (DUT) by LAN cable.
3. Setting Client (DUT) ip 172.22.12.68
   # ifconfig eth0 172.22.12.68
4. DUT Send test:
   Server: PC
   # iperf –s –t 86400
   Client: DUT
   # ./iperf -c 172.22.12.76 –w 300k -t 60
   Waitting 60 seconds to check LAN throughput speed.
5. DUT Receve test:
   Server: DUT
   # ./iperf –s –t 86400
   Client: PC
   # iperf -c 172.22.12.68 –w 300k -t 60
   Waitting 60 seconds to check LAN throughput speed.

3.04.1.05 Test Result:

Item	Criteria	Result	Notes
LAN0_enP1p5s0f0	Tx speed: 923Mbits/sec	**PASS**	
	Rx speed: 879Mbits/sec	**PASS**	
LAN1_enP1p5s0f1	Tx speed: 728Mbits/sec	**PASS**	
	Rx speed: 912Mbits/sec	**PASS**	

Chapter 4： Compatibility Test

4.01 SD Compatibility

4.01.1.01 Test Purpose：

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

4.01.1.02 Test Tool or Equipment:

1. USB to serial RS232 cable
2. Memory SD card

4.01.1.03 Testing Configuration:

1. Test environment: Room temperature

4.01.1.04 Test Procedure:

1. Turn on the power and boot to OS.
2. Connect SD Card to SD slot.
3. Make sure system can detect the SD Card and can be access.
   # dd if=/dev/zero of=/mnt/sdcard/testFile bs=1M count=1000
   # dd if=/mnt/ sdcard /testFile of=/dev/zero bs=1M
4. Repeat step3 to test different SD card.

4.01.1.05 Test Result:

Test Item Description					Criteria	Result	Notes
Brand Name	Model/Spec	Capacity	Speed	QE NO.			
SanDisk	SDHC/UHS-I Card	32GB	SDHC C10	MC-A00051	There is no error by test	**PASS**	
Transcend	TS32GUSDHC10	32GB	SDHC C10	MC-A00326		**PASS**	
ADATA	Premier SDXC	64GB	SDHC C10	MC-A00335		**PASS**	

4.02 USB Compatibility

4.02.1.01 Test Purpose：

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

4.02.1.02 Test Tool or Equipment:

1. USB to serial RS232 cable
2. USB Storage Device

4.02.1.03 Testing Configuration:

1. Test environment: Room temperature

4.02.1.04 Test Procedure:

1. Turn on the power and boot to OS.
2. Connect USB Storage to USB.
3. Make sure system can detect the USB Storage and can be access.
4. Repeat step2 to step3 to test.

4.02.1.05 Test Result:

Test Item Description					Criteria	Result	Notes
Brand Name	Model/Type	Capacity	Interface	QE NO.			
Kingston	DTVIVR/8GBCN	8GB	USB 2.0	US-A00156	There is no error by test	**PASS**	
Apacer	AH350	16GB	USB3.0	US-A00137		**PASS**	
ADATA	UV128	64GB	USB3.0	US-A00199		**PASS**	

Chapter 5：Reliability Test

5.01 System On/Off Test

5.01.1 Power cycle test

5.01.1.01 Test Purpose：

Confirm whether the DUT restarts normally with the AC on/off test.

5.01.1.02 Test Tool or Equipment:

1. USB to serial RS232 cable
2. RS232 cable
3. Power on/off test equipment (ATX/AT)

5.01.1.03 Testing Configuration:

1. Test environment: Room temperature

5.01.1.04 Test Procedure:

1. Connect power cable of DUT to auto on/off machine.
2. Set boot time for 50 sec; off time for 3 sec for auto on/off machine.
3. During the boot time, DUT should enter OS environment.
4. During the off time, keep DUT off.
5. Repeat steps 4~5 for 1000 round time.

5.01.1.05 Test Result:

Item	Criteria	Result	Note
AT power cycle test	No error happened in 1000 times	**PASS**	
ATX power cycle test		**PASS**	

5.02 CPU Burinin Test

5.02.1.01 Test Purpose：

The purpose of this test is to stress and ensure the stability of the CPU.

5.02.1.02 Test Tool or Equipment

1. USB to serial RS232 cable
2. RS232 cable

5.02.1.03 Testing Configuration:

1. Test environment: Room temperature

5.02.1.04 Test Procedure:

1. Turn on the power and boot to OS
2. Run cpuburn-in test program under OS
   Stress-ng –cpu 8 –timeout 43200

5.02.1.05 Test Result:

Item	Criteria	Result	Note
CPU Burn-in	Burn-in for 12 hours. The DUT MUST maintain a stable condition after the test has been completed.	**PASS**	

5.03 Memory Burinin Test

5.03.1.01 Test Purpose：

The purpose of this test is to stress and ensure the stability of the Memory.

5.03.1.02 Test Tool or Equipment：

1. USB to serial RS232 cable
2. SD Card
3. Testing tool: memtester

5.03.1.03 Testing Configuration:

1. Test environment: Room temperature

5.03.1.04 Test Procedure:

1. Turn on the power and boot to OS
2. Run memtester test program under OS.

   # memtester 1000 500

5.03.1.05 Test Result:

Item	Criteria	Result	Note
memtester	Burn-in for 12 hours. The DUT MUST maintain a stable condition after the test has been completed.	**PASS**	

5.04 COM Port Stress Test

5.04.1.01 Test Purpose：

The purpose of this test is to stress and ensure the stability of the Serial Port.

5.04.1.02 Test Tool or Equipment

1. USB to serial RS232 cable.
2. SD Card
3. RS232 loopback testing fixture.

5.04.1.03 Testing Configuration:

1. Test environment: Room temperature
2. Test tool: st-fsl
   Baud Rate: 115200
   Data Bits: 8
   Parity: None
   Stop Bits: 1

5.04.1.04 Test Procedure:

1. Turn on the power and boot to OS.
2. Connect RS232 loopback testing fixture to COM port.
3. Run the test program for 12 hours under OS.
   # ./uart.sh

5.04.1.05 Test Result:

Item	Criteria	Result	Note
COM1	Burn-in for 12 hours. The DUT MUST maintain a stable condition after the test has been completed.	**PASS**	
COM2		**PASS**	
COM3		**PASS**	

5.05 LAN Stress Test

5.05.1.01 Test Purpose：

The purpose of this test is to examine the LAN performance and to ensure the quality and stability of the Ethernet controllers.

5.05.1.02 Test Tool or Equipment:

1. USB to serial RS232 cable
2. Cble length: Cat.5E (3m).
3. Ubuntu server

5.05.1.03 Testing Configuration:

1. Test environment: Room temperature
2. Test tool: Iperf, Window Size: 300Kbytes

5.05.1.04 Test Procedure:

1. Turn on the power and boot to OS.
2. Connect Iperf Server and Client (DUT) by LAN cable.
3. Setting Client (DUT) ip 172.22.12.68
   # ifconfig eth0 172.22.12.68
4. DUT Send test:
   Server: PC
   # iperf –s –t 86400
   Client: DUT
   # ./iperf -c 172.22.12.76 –w 300k -t 86400 –P 5
   Waitting 1 day to check LAN stability.
5. DUT Receve test:
   Server: DUT
   # ./iperf –s –t 86400
   Client: PC
   # iperf -c 172.22.12.68 –w 300k -t 86400 –P 5
   Waitting 1day to check LAN stability.

5.05.1.05 Test Result:

Item	Criteria	Result	Note
LAN1	Burn-in for 12 hours. The DUT MUST maintain a stable condition after the test has been completed.	**PASS**	
LAN2		**PASS**	