

(EAP1024A-V2-1215-ZZ)

MFG Test Plan

EAP1024A-V2-1215-ZZ

Version: V1.00

By Author(Jimmy Cheng #3283)

Doc. Number: FMA-TA01000-01

Date: 10/13/2016

Accton Technology Corporation

MFG Engineering Integration Team & Test Automation Team

No. 1, Creation Rd. III, Science-Based Industrial Park,

Hsinchu 300, Taiwan, R.O.C.

本資料為智邦集團專有之財產，非經許可不得複製、翻印或轉變成其他形式使用

This document is the exclusive property of **Accton Group** and shall not be reproduced or copied or transformed to any other format without prior permission of **Accton Group**.

保存期限:五年

FMA-TA01000-01 R01

Copyright by Accton Technology Corporation. All rights reserved.

The drawings, specifications and the data contain herein are the exclusive property of Accton Technology Corp. issued in strict confidence and shall not, without the prior written permission of Accton Technology Corp., be reproduced, copied or used, in parts or as a whole, for any purpose whatsoever, except the manufacture of articles for Accton Technology Corp.

Accton makes no warranties with respect to the correctness, accuracy or wholeness of this PRELIMINARY specification. The information in this document is subject to change without notice. Accton reserves the right to make revisions to this document and the product described herein without obligation to notify any person or entity of any such changes.

Warning

This document is intended for internal use only. A Non-Disclosure Agreement (NDA) approved by Chief Technology Officer (CTO) is required to release this document under any circumstances.

Reviewed By: JS Huang Date: 2015 / 10 / 13

Approved By: JS Huang Date: 2015 / 10 / 13

Released By: Jimmy Cheng Date: 2015 / 10 / 13

Accton and SwitchHub are trademarks or registered trademarks of Accton Technology Corporation. Other trademarks or brand names mentioned herein are trademarks of their respective companies .

Revision History

Rev.	Date	Author	Revision Description
V1.00	2015/10/13	Jimmy	1 st Release

本資料為智邦集團專有之財產，非經許可不得複製、翻印或轉變成其他形式使用

This document is the exclusive property of **Accton Group** and shall not be reproduced or copied or transformed to any other format without prior permission of **Accton Group**.

保存期限:五年

FMA-TA01000-01 R01

Table of Content

1.	Overview	1
1.1	Purpose	1
1.2	Reference.....	1
1.3	Glossary.....	1
1.4	Product Description (Shipping configuration)	2
1.4.1	Introduction	2
1.4.2	Product Description.....	2
1.4.3	Block Diagram	2
1.5	Key Target dates	4
2.	Test Process	4
2.1	Goals.....	4
2.2	Key Issues	4
2.3	Test Process Flow	4
2.3.1.1	SPI	6
2.3.1.2	AOI.....	6
2.3.1.3	X-Ray	6
2.3.1.4	PT Test Environment Setup.....	6
2.3.1.5	PT Hardware Requirement	7
2.3.1.6	PT Software Requirement	7
2.3.1.7	PT Test Items	7
2.3.1.7.1.	PoE Powered Wire Change test.....	7
2.3.1.7.2.	Check DC adapter test.....	8
2.3.1.7.3.	POST (Power-On Self-Test) Test	9
2.3.1.7.4.	PoE test.....	9
2.3.1.7.5.	Download Accton ram diag firmware code.....	9
2.3.1.7.6.	ETH0 and ETH1 External Loopback Test.....	9
2.3.1.7.7.	i2c Test	11
2.3.1.7.8.	Button Test	11
2.3.1.7.9.	LED Test.....	12
2.3.1.7.10.	Temperature Sensor Test	12
2.3.1.7.11.	Memory Test.....	12

本資料為智邦集團專有之財產，非經許可不得複製、翻印或轉變成其他形式使用

This document is the exclusive property of **Accton Group** and shall not be reproduced or copied or transformed to any other format without prior permission of **Accton Group**.

保存期限:五年

FMA-TA01000-01 R01

2.3.1.7.12.	Download BLE Firmware	14
2.3.1.7.13.	BLE Transmitter and Receiver Test	14
2.3.1.7.14.	USB Test.....	15
2.3.1.7.15.	Power Calibration Test for QCA9994 5G	15
2.3.1.7.16.	Power Accuracy Test for QCA9994 5G	15
2.3.1.7.17.	Transmit EVM Test for QCA9994 5G	15
2.3.1.7.18.	Receiver PER Test for QCA9994 5G	15
2.3.1.7.19.	Power Calibration Test for QCA9994 2G	15
2.3.1.7.20.	Power Accuracy Test for QCA9994 2G	15
2.3.1.7.21.	Transmit EVM Test for QCA9994 2G	16
2.3.1.7.22.	Receiver PER Test for QCA9994 2G	16
2.3.1.8	Transmit Power Calibration Table.....	16
2.3.2	System Level Final Test	16
2.3.2.1	FT Test Environment Setup.....	16
2.3.2.2	FT Hardware Requirement	17
2.3.2.3	FT Software Requirement	17
2.3.2.4	FT Test Items	17
2.3.2.4.1.	POST (Power-On Self-Test) Test	17
2.3.2.4.2.	Run Backdoor diag firmware code.....	18
2.3.2.4.3.	BLE Transmit and Receiver Test.....	18
2.3.2.4.4.	WLAN Throughput test.....	18
2.3.3	OQC	19
3.	Design Requirements	19
3.1	Hardware design requirements	19
3.2	Software/Diagnostics design requirements	19
4.	Appendix	19
4.1	HW Test Case List.....	19
4.2	Test Data Log Format and Requirements	19
4.3	Shop Floor Control Requirements.....	20

Tables

本資料為智邦集團專有之財產，非經許可不得複製、翻印或轉變成其他形式使用

This document is the exclusive property of **Accton Group** and shall not be reproduced or copied or transformed to any other format without prior permission of **Accton Group**.

保存期限:五年

FMA-TA01000-01 R01

Table 1-1	Reference Document Table.....	1
Table 1-2	Glossary Table	1

Figures

Figure 2-1	Board Level Test Setup Configuration	錯誤! 尚未定義書籤。
Figure 2-2	Board Level Test Setup Configuration	錯誤! 尚未定義書籤。
Figure 2-3	System Level Final Test 1 Setup Configuration	17
Figure 2-4	System Level Final Test 2 Setup Configuration	錯誤! 尚未定義書籤。

1. Overview

1.1 Purpose

This document describes the manufacturing test plan for the [EAP8024A-1014-MK](#) product. It also identifies design requirements that need to be fulfilled for successful implementation of this test plan. Target audience for this document is the Meraki operations & design team and contract manufacturing personnel.

1.2 Reference

Table 1-1 Reference Document Table

Title	Link
HW Function Test Case List	https://acprd.accton.com.tw/DCP/HWFunctionTestCaseList/-MK/EAP8024A-1014-MK/HW%20Function%20Test%20Case%20List%20R04(EAP8024A-1014-MK).xlsx
Bigfoot PRD	https://acprd.accton.com.tw/DCP/HWFunctionTestCaseList/-MK/EAP8024A-1014-MK/Big%20Foot%20PRD%20v0.7.pdf

1.3 Glossary

Table 1-2 Glossary Table

PT	Pre-Test
FT	Final-Test
MDA	Manufacturing Defects Analyzer (Static ICT)
DFT	Design For Testing
ORT	On-going Reliability Test
SMD	Surface Mount Device
AOI	Auto Optical Inspector
DIP	Manual Put component then flow automatic furnace
OOBA	Out Of Box Audit
PWC	Powered Wire Change

本資料為智邦集團專有之財產，非經許可不得複製、翻印或轉變成其他形式使用

1 of 12

This document is the exclusive property of **Accton Group** and shall not be reproduced or copied or transformed to any other format without prior permission of **Accton Group**.

保存期限:五年

FMA-TA01000-01 R01

1.4 Product Description (Shipping configuration)

1.4.1 Introduction

Bigfoot is a 4x4 concurrent dual band 802.11a/b/g/n/ac wireless access point with a 1x1 scanning radio and Bluetooth Low Energy host. It has two bonded one gigabit Ethernet wide area network uplink and Power over Ethernet physical device that is 802.3at compliant.

1.4.2 Product Description

Product Summary

QCA IPQ8068 (Akronite) dual-core ARM processor

QCA9994 4x4 MU-MIMO 802.11ac/a/n single band radio

2.4GHz 4x4 QCA9994 802.11a/b/g/n/ac wave 2 WIFI radio

2.4GHz/5GHz 1x1 QCA9889 802.11a/b/g/n/ac wave 1 scanning radio

TI CC2540/1 Bluetooth radio

Two 2Gb DDR3-1600 DRAM

1Gb NAND Flash

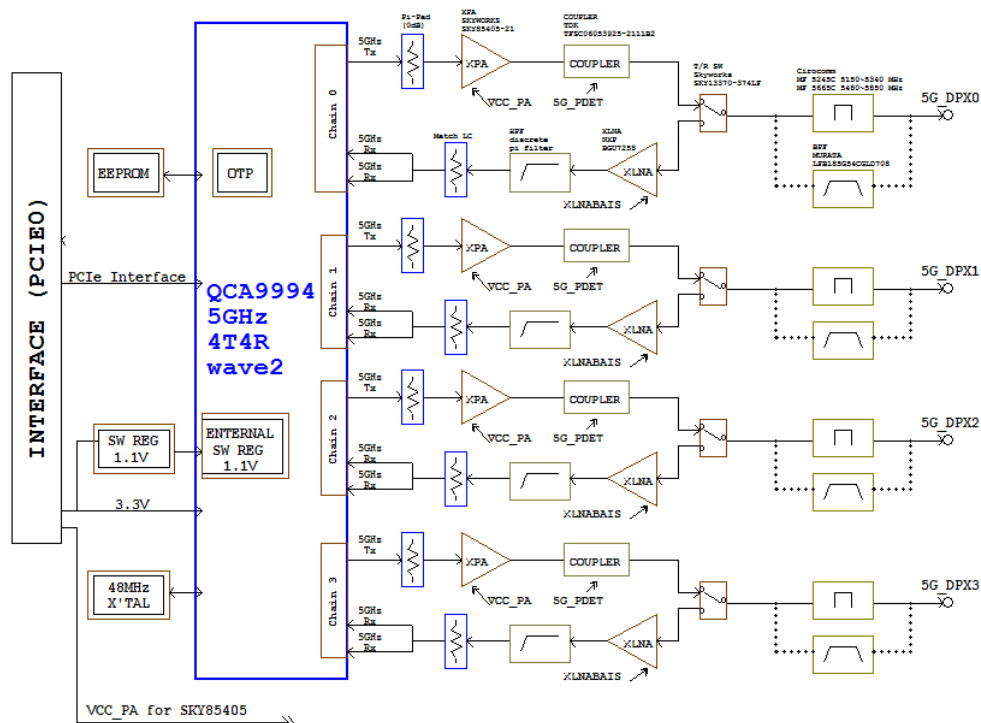
Discrete front end design for traffic radio

- o 2.4GHz PA/LNA + switch

- o 5GHz PA/LNA + switch

Front end integrated design for scanning radio

1.4.3 Block Diagram



1.5 Key Target dates

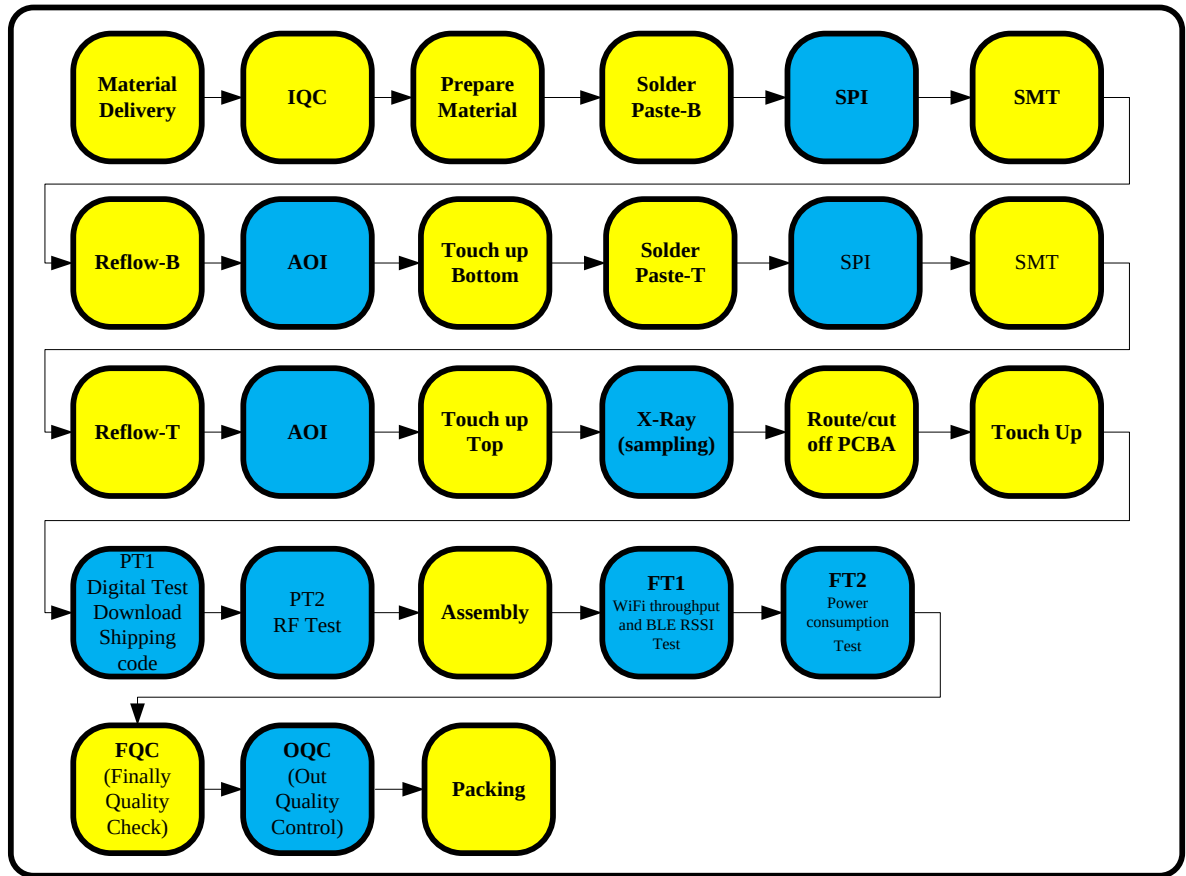
2. Test Process

2.1 Goals

Follow up the Test Plan and sync with all member include MFG. Development team and customer side can well understanding and follow up to maintain the good quality for shipment.

2.2 Key Issues

2.3 Test Process Flow



Test Details

The specific test process requirements for each SKU will be described later in this document. A general test process flow includes;

- Board Level Functional Test
- System Level Final Test

2.3.1.1 SPI

SPI inspection will use 3D solder paste inspector to measure the solder thickness and solder paste printing quality, The criteria is follow IPC-A-610 standard, the Cpk of thickness will greater than 1.33, so can avoid the solder join issue. And will performance 100% check in production line.

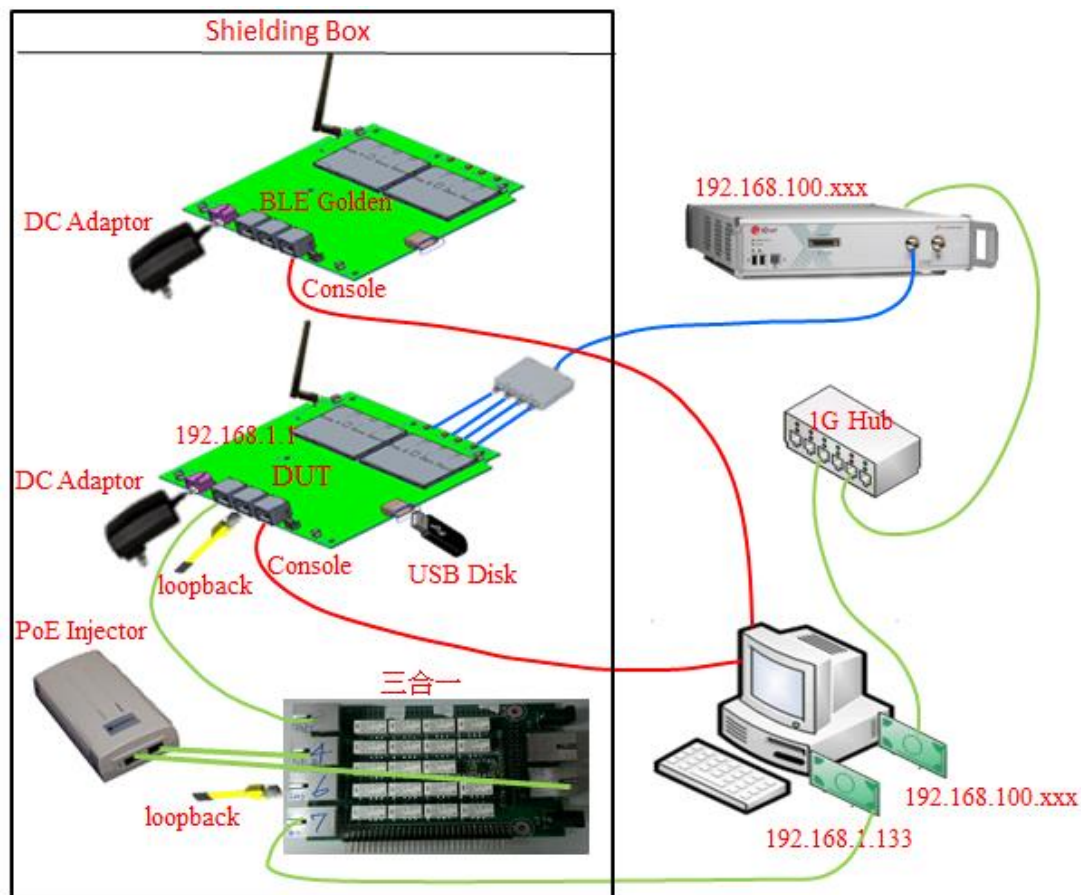
2.3.1.2 AOI

AOI inspection can check the solder join issue, it is include short, open, poor soldering parts polarity, location, part spec., missing part, extra part, part tombstone, part damage, part reverse, etc. The performance should in production line 100% inspection.

2.3.1.3 X-Ray

X-ray inspection can check the BGA type and Ground pad in bottom side component solder joint quality. It can find the solder short, open, crack, void. In sample and pilot run stage, will do 100% inspection, and mass production will be performance FAI 10 pcs and 1 piece per 2 hours.

2.3.1.4 PT Test Environment Setup



2.3.1.5 PT Hardware Requirement

- Pentium PC (or above) running Win7 x 1
- RS232 Console cable x 1 (DB9 to RJ45)
- RJ45 Cable x 6
- Arduino + Control Board x 1
- 802.3at PoE Injector x 1
- 1G HUB x 1
- Console Board x 4
- DC Adapter 12V / 2.0A x 2
- IQxel x1
- Attenuator 10 dB x 10
- Power Divider x 1
- RF Cable x N
- Shielding Box x 1
- Antenna x 2
- USB flash drive x 1

2.3.1.6 PT Software Requirement

Microsoft OS Windows 7 or above

ActiveTCL: Tcl v8.5.17

Arduino Driver.

MATLAB(R) Compiler Runtime 7.9

Microsoft Visual C++ 2008 Redistributable

Microsoft Visual C++ 2012 Redistributable

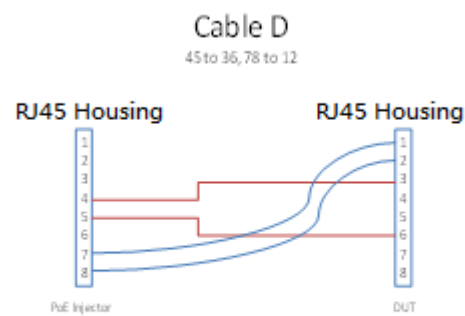
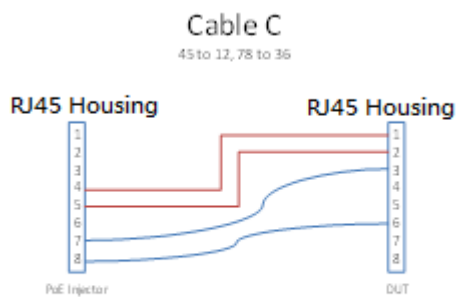
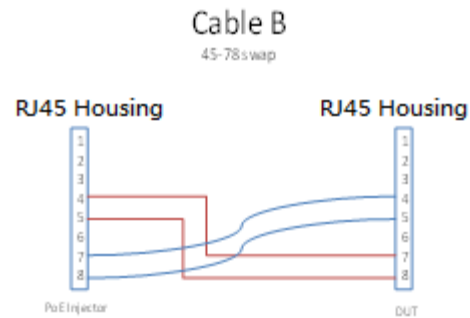
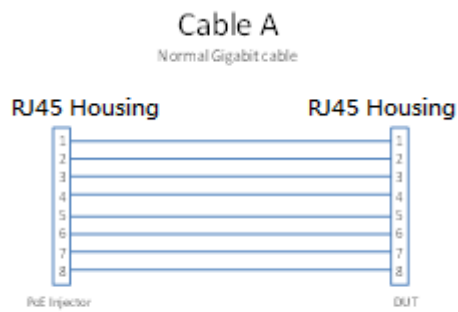
IQFact_plus Test Solution

2.3.1.7 PT Test Items

Run requested Test Items without any fail condition.

2.3.1.7.1. PoE Powered Wire Change test

DUT must pass 4 Crossover cable LED light on test.



Switch to NONE ** PASS
 Switch to Cable A ...**** PASS
 Switch to NONE ** PASS
 Switch to Cable B ...**** PASS
 Switch to NONE ** PASS
 Switch to Cable C ...**** PASS
 Switch to NONE ** PASS
 Switch to Cable D ...**** PASS
 Switch to NONE ** PASS
PWC Test : PASSED

#

2.3.1.7.2. Check DC adapter test

To make sure DC adapter can boot up normally.

```
(EAP1024A-V2-1215-ZZ) # ps
PoE: IEEE802.3af or 12V Adapter
(EAP1024A-V2-1215-ZZ) #
```

2.3.1.7.3. POST (Power-On Self-Test) Test

To make sure the system can boot up successfully and major H/W functions are working. This test covers the functions of CPU, RAM, NAND Flash, Ethernet, PCI and power adapter source.

2.3.1.7.4. PoE test

To make sure PoE can boot up normally.

```
(EAP1024A-V2-1215-ZZ) # ps

PoE: IEEE802.3af or 12V Adapter
(EAP1024A-V2-1215-ZZ) #
```

2.3.1.7.5. Download Accton ram diag firmware code

To download Accton's ram diag code via TFTP is for production test.

```
(EAP1024A-V2-1215-ZZ) # set machid 136b && set ethact eth0 && tftpboot 0x41000000
nornand-ipq806x-single.img && sf probe && imgaddr=0x41000000 && source $imgaddr:script
```

2.3.1.7.6. ETH0 and ETH1 External Loopback Test

TP will trigger the DUT to run external loopback test through ETH0 and ETH1, to ensure both ports are operational.

```
(EAP1024A-V2-1215-ZZ) # set ethact eth0
(EAP1024A-V2-1215-ZZ) # lb 0 e 1500 1000
```

External Loopback Test (One packet send then receive):

1000M
Full duplex link

Link 2 up, Phy_status = b0a0a
.Retry 0 times, Test time = 0.857 (s)
Send Pkts= 1000, Rec Pkts = 1000, Loss count = 0 ,Success !!

100M
Full duplex link
Link 2 up, Phy_status = 70a0a
Retry 0 times, Test time = 1.404 (s)
Send Pkts= 1000, Rec Pkts = 1000, Loss count = 0 ,Success !!

10M
Full duplex link
Link 2 up, Phy_status = 30a0a
Retry 0 times, Test time = 2.597 (s)
Send Pkts= 1000, Rec Pkts = 1000, Loss count = 0 ,Success !!
=====
Test Result : Pass.
=====

(EAP1024A-V2-1215-ZZ) # set ethact eth1
(EAP1024A-V2-1215-ZZ) # lb 1 e 1500 1000

External Loopback Test (One packet send then receive):

1000M
Full duplex link
Link 2 up, Phy_status = b0a0a
.Retry 0 times, Test time = 0.857 (s)
Send Pkts= 1000, Rec Pkts = 1000, Loss count = 0 ,Success !!

100M
Full duplex link
Link 2 up, Phy_status = 70a0a
Retry 0 times, Test time = 1.404 (s)

Send Pkts= 1000, Rec Pkts = 1000, Loss count = 0 ,Success !!

10M

Full duplex link

Link 2 up, Phy_status = 30a0a

Retry 0 times, Test time = 2.597 (s)

Send Pkts= 1000, Rec Pkts = 1000, Loss count = 0 ,Success !!

=====

Test Result : Pass.

=====

(EAP1024A-V2-1215-ZZ) #

2.3.1.7.7. i2c Test

Test program (TP) will probe the I2C bus to ensure all I2C components are responsive.

(EAP1024A-V2-1215-ZZ) # i2ctest

SMB208 : Pass

SMB209 : Pass

INA219 : Pass

Temp sen: Pass

TPM dev: Pass

=====

Result : All Pass

(EAP1024A-V2-1215-ZZ) #

2.3.1.7.8. Button Test

Test program trigger the F/W to detect Button status, the test program will ask operator to press or release.

(EAP1024A-V2-1215-ZZ) # pbt

Test the push button (ctrl + c to stop)...

Detect the button pushed !!

Detect the button released !!

Test: Pass !!

(EAP1024A-V2-1215-ZZ) #

2.3.1.7.9. LED Test

Turn on All LED separately, and check all LED are correct.

2.3.1.7.10. Temperature Sensor Test

TP will read the temperature value through I2C bus, to make sure the temperature sensor is working well. As the temperature sensors need no calibration, there's no calibration related actions here.

(EAP1024A-V2-1215-ZZ) #temp

1. Local temp : 27.6875 'C

2. Remote temp : 26.6875 'C

3. Remote temp : 26.8125 'C

4. Remote temp : 30.8750 'C

(EAP1024A-V2-1215-ZZ) #

2.3.1.7.11. Memory Test

To run testm for memory test.

- For 32bits Configure to 1 and 0
- To run testm for memory test.

(EAP1024A-V2-1215-ZZ) # testm 1

DDR chip 1 : Start_addr = 0x42000000, End_addr = 0x43000000

0. Test pattern : 0x00000000

Writing Data.....

Verifing Data.....PASS!!

1. Test pattern : 0xffffffff

Writing Data.....

Verifing Data.....PASS!!

2. Test pattern : 0x55555555

Writing Data.....

Verifing Data.....PASS!!

3. Test pattern : 0xaaaaaaaa

Writing Data.....

Verifying Data.....PASS!!

4. Test pattern : 0x5a5a5a5a

Writing Data.....

Verifying Data.....PASS!!

5. Test pattern : 0xa5a5a5a5

Writing Data.....

Verifying Data.....PASS!!

Result:ALL PASS!!

(EAP1024A-V2-1215-ZZ) # [testm 2](#)

DDR chip 2 : Start_addr = 0x52000000, End_addr = 0x53000000

0. Test pattern : 0x00000000

Writing Data.....

Verifying Data.....PASS!!

1. Test pattern : 0xffffffff

Writing Data.....

Verifying Data.....PASS!!

2. Test pattern : 0x55555555

Writing Data.....

Verifying Data.....PASS!!

3. Test pattern : 0xaaaaaaaa

Writing Data.....

Verifying Data.....PASS!!

4. Test pattern : 0x5a5a5a5a

Writing Data.....

Verifying Data.....PASS!!

5. Test pattern : 0xa5a5a5a5

Writing Data.....

Verifying Data.....PASS!!

Result:ALL PASS!!

(EAP1024A-V2-1215-ZZ) #

2.3.1.7.12. Download BLE Firmware

TP will download BLE's Firmware from path /etc/accton.

```
root@OpenWrt:/# cd /etc/accton
```

```
root@OpenWrt:/etc/accton# ble flash write accton_ble_fw.bin
```

Write data to BLE flash -> Completed.

2.3.1.7.13. BLE Transmitter and Receiver Test

TP will trigger the DUT and Golden to send packets through BLE, to ensure Transmitter and Receiver are operational.

```
root@OpenWrt:/# ble tx 0 37 0
```

Start Continuous TX (channel: 0, length: 37, code: 0) -> Completed.

Transmitting packets ...

```
root@OpenWrt:/# ble tx stop
```

Stop Continuous TX -> Completed.

```
root@OpenWrt:/#
```

```
#####
```

```
# <time:14:52:25> ble rx stop #
```

```
# Received 7918 packets... #
```

```
# (EAP1024A-V2-1215-ZZ) # #
```

```
# #
```

```
#####
```

```
root@OpenWrt:/# ble rx 0
```

Start RX mode (channel: 0) -> Completed.

Receiving packets ...

```
root@OpenWrt:/# ble rx stop
```

Stop RX mode -> Completed.

Received 7994 packets.

```
root@OpenWrt:/#
```

2.3.1.7.14. USB Test

TP will test if the USB flash drive mount on DUT successfully.

```
root@OpenWrt:/#mw 801420 303
```

```
root@OpenWrt:/# mw 801424 2
```

```
root@OpenWrt:/#fdisk -l
```

Device	Boot	Start	End	Blocks	Id	System
/dev/sda1	*	32	127999	63984	4	FAT16 <32M

2.3.1.7.15. Power Calibration Test for QCA9994 5G

Find the actual power reading from One Box Tester with various register settings. Snapshot of the measured data at these frequencies piers is then programmed as the calibration data into FLASH.

2.3.1.7.16. Power Accuracy Test for QCA9994 5G

After calibration, measure power at the test frequencies at various rates and measure the output power to ensure if the cards can accurately control the output power at the desired target power levels.

2.3.1.7.17. Transmit EVM Test for QCA9994 5G

EVM typically limits the transmit performance at higher OFDM system bit rates and therefore the transmitter must be verified at the highest bit-rates.

2.3.1.7.18. Receiver PER Test for QCA9994 5G

Perform a Package Error Rate (PER) measurement at the given frequency and modulation.

2.3.1.7.19. Power Calibration Test for QCA9994 2G

Find the actual power reading from One Box Tester with various register settings. Snapshot of the measured data at these frequencies piers is then programmed as the calibration data into Flash.

2.3.1.7.20. Power Accuracy Test for QCA9994 2G

After calibration, measure power at the test frequencies at various rates and measure the

output power to ensure if the cards can accurately control the output power at the desired target power levels.

2.3.1.7.21. Transmit EVM Test for QCA9994 2G

EVM typically limits the transmit performance at higher OFDM system bit rates and therefore the transmitter must be verified at the highest bit-rates.

2.3.1.7.22. Receiver PER Test for QCA9994 2G

Perform a Package Error Rate (PER) measurement at the given frequency and modulation.

2.3.1.8 Transmit Power Calibration Table



Bigfoot RF Test

Criteria v01_9994.xls



TX power

calibration_9994.xlsx

2.3.2 System Level Final Test

2.3.2.1 FT Test Environment Setup

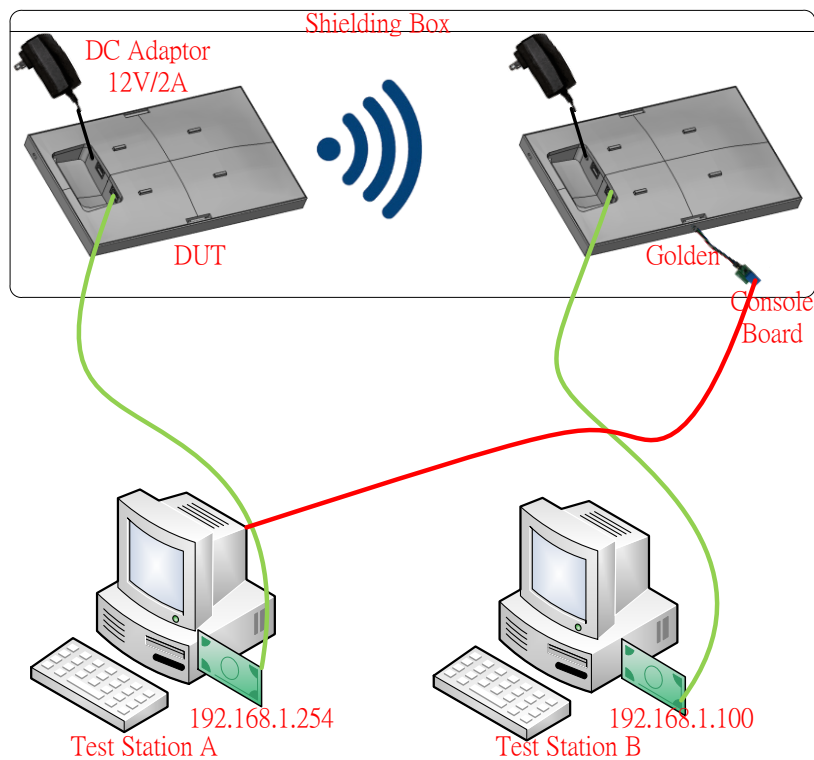


Figure 2-1 System Level Final Test 1 Setup Configuration

2.3.2.2 FT Hardware Requirement

- Pentium PC (or above) running Win7 x 2
- Shielding Box x 1
- Golden Unit x 1
- DC Adaptor 12V/2A x 2
- Console Board x 1

2.3.2.3 FT Software Requirement

Microsoft OS Windows 7 or above

ActiveTCL: Tcl v8.5.17

NMAP: 6.4.7

2.3.2.4 FT Test Items

Run requested Test Items without any fail condition.

2.3.2.4.1. POST (Power-On Self-Test) Test

Repeat section 2.4.1.4.1

2.3.2.4.2. Run Backdoor diag firmware code.

Press Reset button and boot up by diag firmware code.

2.3.2.4.3. BLE Transmit and Receiver Test

Repeat section 2.3.1.11.4

2.3.2.4.4. WLAN Throughput test

To setup WLAN link under runtime then perform 5G and 2.4G radio traffic test.

Using Iperf as the test program tool, we will connect two station during Giga switch to test the throughput value.

Put test program into C disk and open Iperf-Server folder

Click Iperf-Server.bat file to make PC2 as server to receive data

Set computer configure to make Wireless Zero Configuration status close

Set the comport and throughput average speed into MainConfig.ini file

Start the test program

Setting server pc and client pc, server pc will waiting for client' s request then reply the throughput data.

Server PC `iperf -s -f m -w 1M -B 192.168.2.100`

Client will set radio mode first. After setting ready, client pc will send the packet to server pc and receive respond packet.

Client PC cmd: `iperf -c 192.168.2.100 -B 192.168.2.1 -f m -w 1M -r -t 5 -P 10`

Test Radio	TX Test Limit	RX Test Limit
QCA9994 5G	TBD.	TBD.
QCA9994 2.4G	TBD.	TBD.

2.3.3 OQC

Refer to OQC SOP.

Document Number : OQC201507-001A

3. Design Requirements

3.1 Hardware design requirements

3.2 Software/Diagnostics design requirements

Base on the HW test case list the Software/Diagnostics will need to enable the software function to target the test. Please see detail requirement in section 4.1 and 錯誤! 找不到參照來源。 .

4. Appendix

4.1 HW Test Case List



HW Function Test
Case List - EAP1024A

4.2 Test Data Log Format and Requirements

- Test Log file name should be

“EAP1024A_HST_<SN>_<TEST-ID>_<RESULT>_<YYYYMMDD>_<hhmmss>_<SFISFLAG>.cap”

<SN>: UUT serial number

<TEST-ID>: PT (Test Description), FT (Test Description)

<RESULT>: PASS/FAIL

<YYYYMMDD>: year for YYYY , MM for Month , DD for day

<hhmmss>: time 24hr format.

<SFISFLAG>: Shop Floor Enable Flag (Y or N)

Example:

EAP1024A_HST_PT_AG29000190_20160720_144536_PASS_Y_1.cap

- All test data logs file of UUT from STA1, STA2, STA3... must be save in
-M\EAP1024A-V2-1215-ZZ\WS_ID\YYYYMMDD\
-M: ODM code default test log path
EAP1024A-V2-1215-ZZ : Accton Model Name
WS_ID: PT/FT
YYYYMMDD: year for YYYY , MM for Month , DD for day
Example:
- ZZ \EAP1024A-V2-1215-ZZ\PT\20160720\
- ZZ \EAP1024A-V2-1215-ZZ\FT\20160720\
- Test data log file should be not overwrite when retest the UUT again
- All test data log file should include the test header as below
 - i. Start Date & Time
 - ii. Work Order Number
 - iii. Functional Test
STA1 (Test Description)
STA2 (Test Description).

4.3 Shop Floor Control Requirements

- Duplication of serial number and MAC Address are not allowed.
- Able to check the correct serial number and MAC OUI format match with OEM model.
- Should allow up to 2 trial of retest and shop floor control system must be updated the latest test result of UUT.
- Failed UUT must not be accepted by next station until the UUT passes the previous test step.
- If retest fail, UUT must not accepted by next station until the UUT passes the previous test step.
- Able to catch and prevent to skip the manufacturing test steps during manufacturing process.