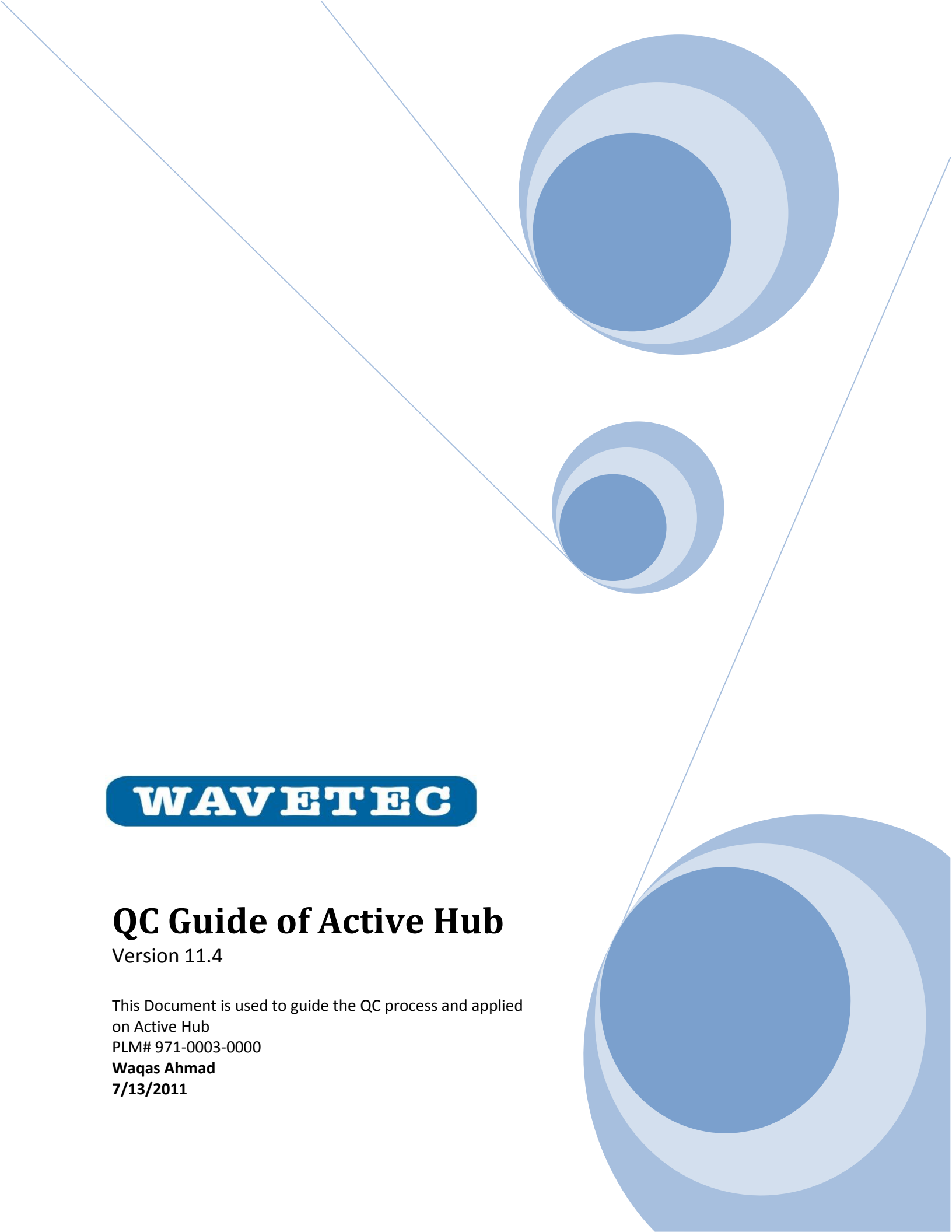


WAVETEC

QC Guide of Active Hub

Version 11.4

This Document is used to guide the QC process and applied on Active Hub

PLM# 971-0003-0000

Waqas Ahmad

7/13/2011

Table of Contents

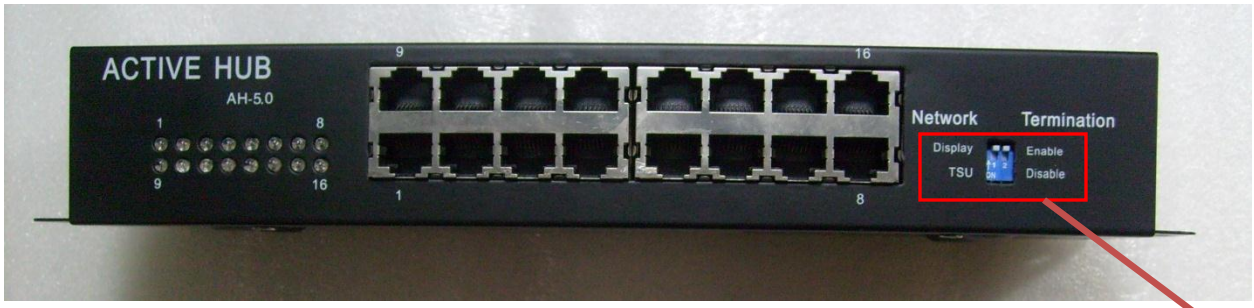
History 4
Part Profile 5
Plan of QC Activity 5
Parts Required 7
QC Procedure 9
Test required on 100% of the product 9
Burn in Test 9
Power Recycling 9
Physical Inspection 9
1- Sharp Edge 9
2- Color is uniform 9
3- Wavetec Logo 9
4- Critical Item part number verification 10
5- Text Printing 11
6- Jumper Setting 11
Functional Test of Active Hub with Network Scanner 13
1. Test Procedure of Testing Active Hub on Display Networks: 14
2. Testing Active Hub on TSU Networks Using IN Port: 16
3. Testing Active Hub on TSU Networks using OUT port: 20
4. Test of Termination DIP Switch 20
Packaging: 22
1- Packing list of parts/accessories 22
2- Sticker Verification 22
3- Carton Box 25
4- Power Cord 25
Check List for Test of 100% of the product 30
Test required for 1% of the product: 31
Component Verification 31
1- IC's / Diodes Verification 31
2- Resistor Verification 31
3- Capacitor Verification 32
4- Connector verification 32
5- Dip Switch 33

6- Crystal 33
7- Inductor.....34
8- DC Jack 34
9- Metal Casing Dimension verification 34
Check List for 1% Test required of the Product 35

History

Date	Version	Description	Author
Aug 27, 2007	1.0	Initial Version	Denny DENG Deng.yonghang@wavetec.com
Jan 16, 2008	2.0	Firmware upgrade to eqPrimeLineExtender5.hex	Denny DENG Deng.yonghang@wavetec.com
Mar 20, 2008	3.0	New test method with TSU and Bar displays.	Denny DENG Deng.yonghang@wavetec.com
18th Nov, 2008	4.0	Add more Test procedures.	Zafar A. Khan/Waqas Ahmad Zafar.khan@wavetec.com/ waqas.ahmad@wavetec.com
27th , April, 2009	5.0	Change in the PCB, IAP (In Application Programming) feature is added, Change the Power Supply from DAJING to MEANWELL Company, having the capability to provide power to CDU's. Also all yellow Led's changes to blue color, WAVETEC logo is also changes to blue color and Dip switch changes from red color to blue color. Also adjust the position of the DIP Switch.	Waqas Ahmad Waqas.ahmad@wavetec.com
29th, April, 2009	6.0	Add warranty Sticker	Waqas Ahmad Waqas.ahmad@wavetec.com
14th,May, 2009	7.0	Make correction	Waqas Ahmad Waqas.ahmad@wavetec.com
08th, June, 2009	8.0	Stickers on Replaceable parts like Power Adapter.	Waqas Ahmad Waqas.ahmad@wavetec.com
29th, June, 2009	9.0	Change in the DIP Switch, Window size for the DIP switch is adjusted, screws changes to flat head & also the sticker which is pasted at the back of Active Hub change but the box sticker will remain same.	Waqas Ahmad Waqas.ahmad@wavetec.com
15th, Nov , 2009	10.0	Change the Communication IC SN75176 to ESD protected ST485ERC	Waqas Ahmad Waqas.ahmad@wavetec.com
12th March, 2010	11.0	Change the Dip switch to Bottom Actuated Model # EPG-102AZ	Waqas Ahmad Waqas.ahmad@wavetec.com
22nd March, 2010	11.1	Change the communication IC from ST485ERC to SN75176.	Waqas Ahmad Waqas.ahmad@wavetec.com
10th June 2010	11.2	Add Checklist	Waqas Ahmad Waqas.ahmad@wavetec.com
10th Dec 2010	11.3	Change the communication IC from SN75176 to ST485ECDR.	Waqas Ahmad Waqas.ahmad@wavetec.com
13th July 2011	11.4	Change the PCB from PT0012L to PT0012M Increase the track of vcc of Gnd of RJ45 to increase the power and data transmission distance.	Waqas Ahmad Waqas.ahmad@wavetec.com

Part Profile



Front View

Position of **"Display"** and **"TSU"** is opposite now

Position of **"Enable"** and **"Disable"** is opposite now

Rare View

Plan of QC Activity

Ensuring timely completion of Product by the CM (Contract Manufacturer):

To ensure that QC activity is performed on the defined and agreed dates with the CM in accordance with the PO dates. It is important that the CM also executes the project plan on timely manner; and completes all tasks on agreed dates. So the first stage is to ensure that CM follows the defined milestones for the timely completion of the product which are;

Milestone# 1 (1~3 days after P.O)

Items	Confirmation Day from CM for ordering the parts
Active hub PCB	3rd Day after P.O
Connector	3rd Day after P.O
MW Adapter	3rd Day after P.O
Power Cord	3rd Day after P.O
Metal casing	3rd Day after P.O
Packaging	3rd Day after P.O

Milestone#2 (18~20th day after P.O)

Items	Confirmation Day from CM for receiving the parts
Active hub PCB	20th Day after P.O
Connector	20th Day after P.O
MW Adapter	6 Weeks
Power Cord	20th Day after P.O
Metal casing	24th Day after P.O
Packaging	26th Day after P.O

Milestone#3 (23~25th day after P.O)

- Confirm with CM for the completion of assembling.

If any milestone not met, inform to supply chain department\CTO for further action.

Hence to follow the above milestones, Wavetec QC staff responsible for the QC of the CM product should follow up with the CM at the end of every week to inquire if the agreed milestone is met. This will require a visit to the CM or in some cases a verbal confirmation through a phone call. A timely follow up will ensure that the QC date will be followed and there will be no unexpected delay in the end.

These above milestones should be mentioned in a "PO monitoring Sheet" with proper date to follow up with respect to the PO date and hence the outcome of the discussion regarding meeting the above milestones should also be logged in that sheet. In the QC document only milestone are mentioned which should be followed.

QC Activity Plan

Once unit is fully assembled, and tested by the CM and verified for its full functionality, than Wavetec's own QC staff should perform the additional QC of the product as per this document.

QC activity of Active Hub will be performed in minimum two days (or more depending on the PO quantity).

Day 1:

On the first day QC person will visit the factory and put the entire units to "**burn in"** test in front of him (For detail see the section "Burn In test") and **randomly take out one unit from the batch and perform 1% Test as explain in section "Test required on 1% of the product"**.

Day 2:

On the second day perform the QC of only those units which were put on "burn in Test" yesterday.

Time Required for the QC

- For 100% Test, total time required for each unit is **5 minutes** per unit.
- For 5% Test, total time required for each unit is **10 minutes**.(this will not stop the QC of 100% units and can be performed in parallel with 100% QC with the help of CM staff)
- For 1% Test, total time required for each unit is **2 hours**.

Now, one can automatically calculate how much time is required for the QC of required purchase order quantity.

Parts Required

Following equipment/component required to perform the QC of Active Hub.

Items	Picture	QTY (For 100% Test)	QTY (For 5%Test)	QTY (For 1%Test)
Network Scanner PCB		1	-	-
WT CDU (Central Power)		4	-	-
Power Adapter (12V/3.34A) For network scanner		1	-	-
Power Adapter (12V/8.4A) For Central Power CDU's		1	-	-
RJ45-RJ45 Straight Cable		5 cables	-	-
RJ45-RJ12 Cable		5 Cable	-	-
RJ12-RJ12 Cable		1 Cable	-	-

TSU		1 unit	-	-
LCR meter		-	-	1 unit
Multi meter		1 unit	1 unit	1 unit
Magnifier Lens		-	-	1 Set
Soldering station with technical person who can perform soldering	-	-	-	1 station

QC Procedure

Test required on 100% of the product

Burn in Test

Connect the DC jack of power adapter with the Active Hub as shown in the figure below and power it **"ON"**.

Once you power ON the adapter the Power LED's will turn ON as shown in the figure below.

Power Recycling

Connect the Active Hub with main AC supply.

- Turn the unit **"ON"** and observe that power LED's turns **"ON"**.
- Now turn **"OFF"** the unit and wait for 1 second and then turn **"ON"** and observe that power LED's turns **"ON"**.
- Now turn it **"OFF"** again, Repeat this procedure 10 times and observe that every time power LED's turns **"ON"**.

Physical Inspection

1- Sharp Edge

- Make sure there is no sharp edge at the corners. Check all the corners of top and bottom enclosure.
- Also make sure there is no dent or any uneven spot on the metal enclosure. Check the Chassis and also the top covers before they are fitted.

2- Color is uniform

- Make sure color of the Active is uniform and both top and bottom enclosure are matching with each other. Color of metal casing should be black.

3- Wavetec Logo

- Make sure Wavetec Logo on the casing should be uniform and straight; also verify the color with pantone code **"7462C"** as well.

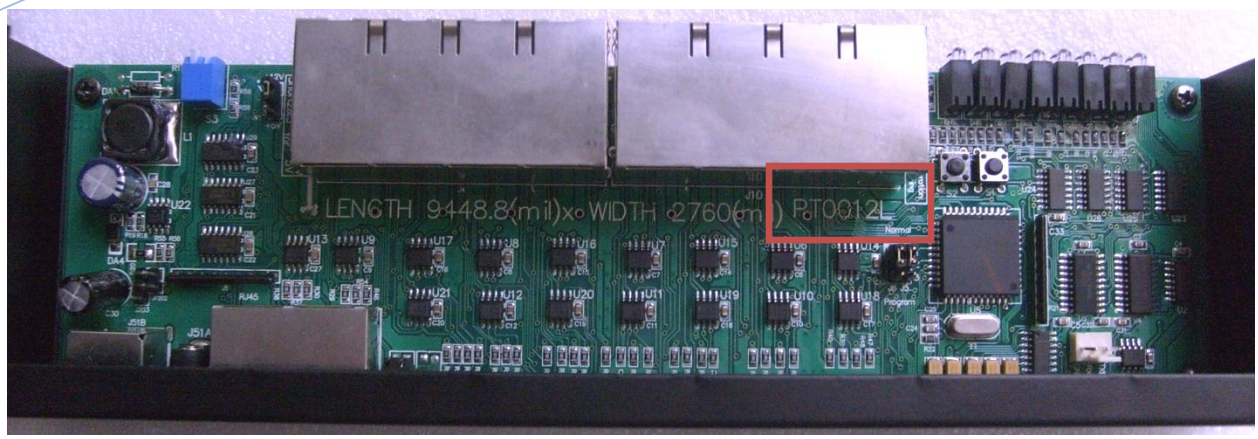
4- Critical Item part number verification

- Make sure Power Adapter should be of Mean well Company **Model # GS40A1-P1J (For without central Power Active Hubs)**.

OR

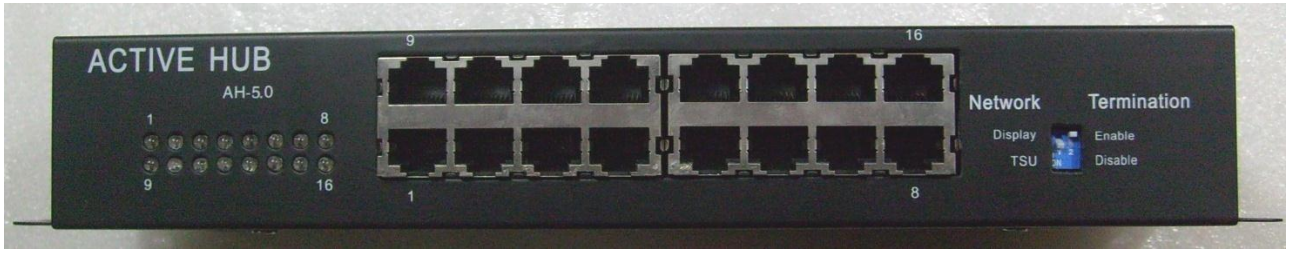
Make sure Power Adapter should be of Mean well Company **Model # AS-120P-12 (For with central Power Active Hubs)**.

- Verify the PCB version number it should be PT0012M as shown in the figure below.



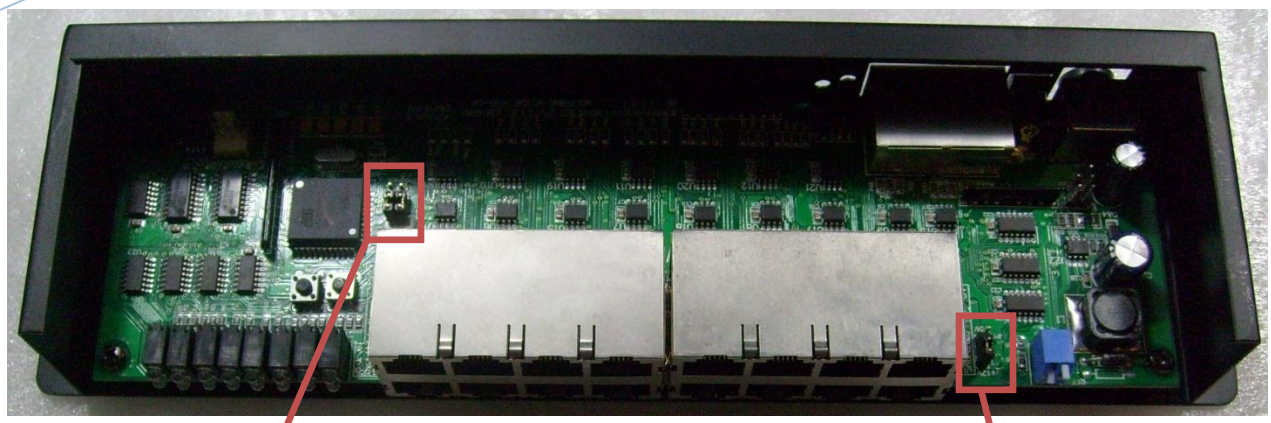
5- Text Printing

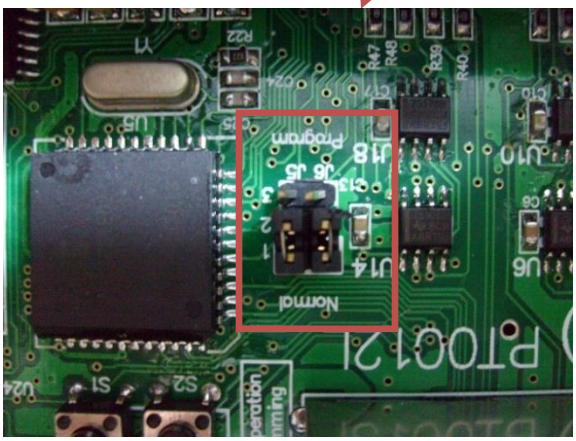
- Text printing of the Active Hub should be uniform as shown in the figure below. Make sure no text should not be missing and wrong printing. Alignment of the complete text is very important. It should not be tilted towards any end and should be very straight.

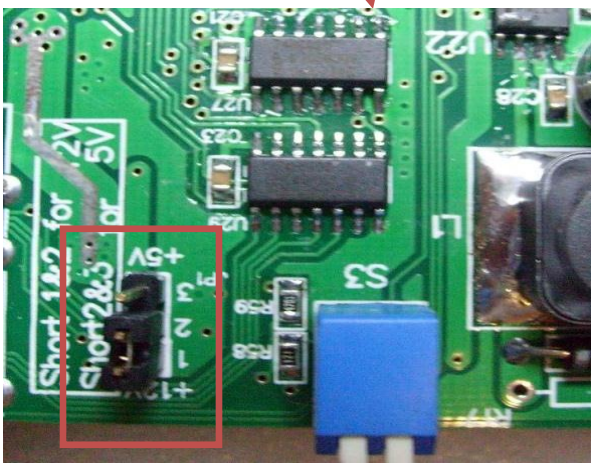


6- Jumper Setting

- Make sure following jumper should be placed on their respective positions as shown in the figure below.




Program
Normal


+5V

Functional Test of Active Hub with Network Scanner

Active Hub is capable of working on two different networks i.e. TSU and Displays. The TSU network works on 57600bps while Display network works on 115200bps. To check the functionality of Active hub, we need a network scanner device to check it on both networks.

Network Scanner PCB

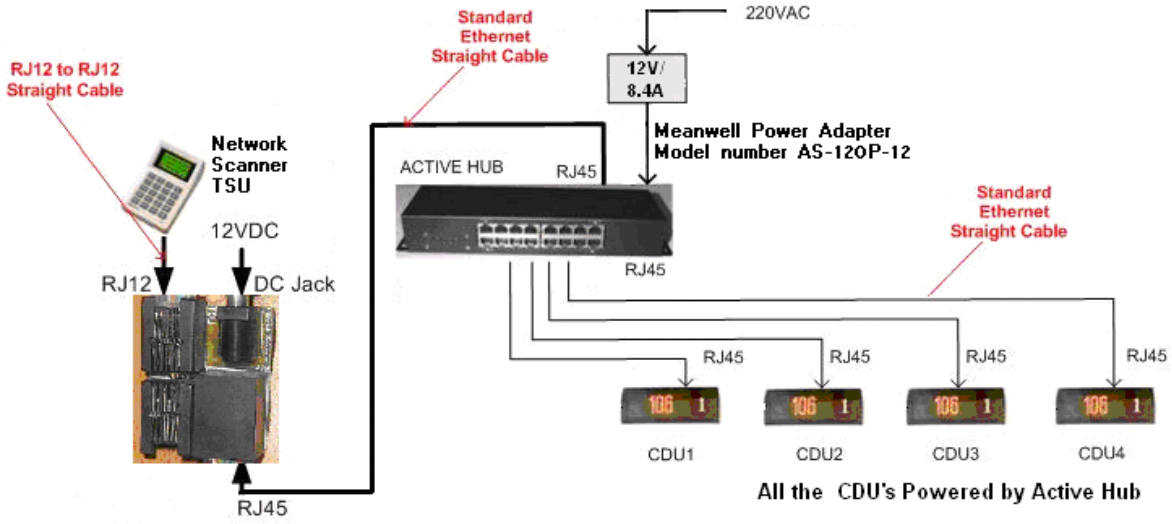
Test Methodology of Active Hub:

A. Network Scanner can scan all TSU / TDU that are connected with the Network. After the scan is completed, the IDs of all alive devices will be shown on the screen.

B. Network Scanner can scan all CDU / SDU that are connected with the Network. The scanning method, for these devices, is slightly different. Network Scanner can broadcast three different messages to all the displays.

Connection of Display Network to Test Active Hub:

The connections of the Active Hub with Network Scanner are shown below.



To test Active Hub on Display Network, Change its DIP switch position to “Display” as shown below.

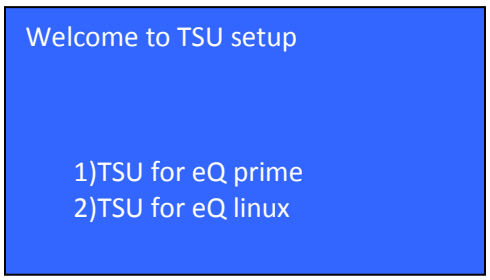
Use opposite configuration as Dip switch is now bottom actuated.

1. Test Procedure of Testing Active Hub on Display Networks:

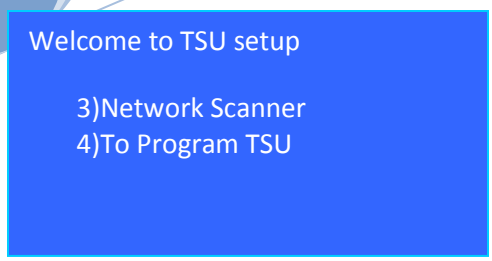
When the TSU is connected with the Network Scanner PCB and the 12V DC adapter is inserted in the DC JACK of Network Scanner PCB, TSU will turn “ON”. Following screen will appear,

After few seconds following message will appear:

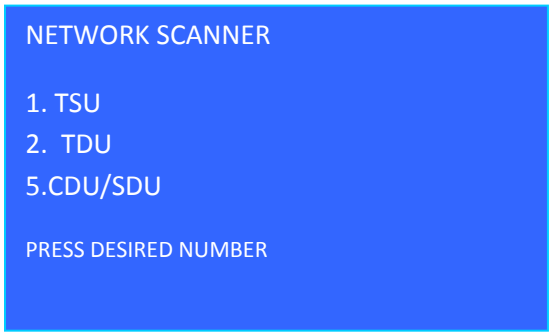
Then Press buttons 3 &4 together for atleast 5 seconds or until following message is appeared.



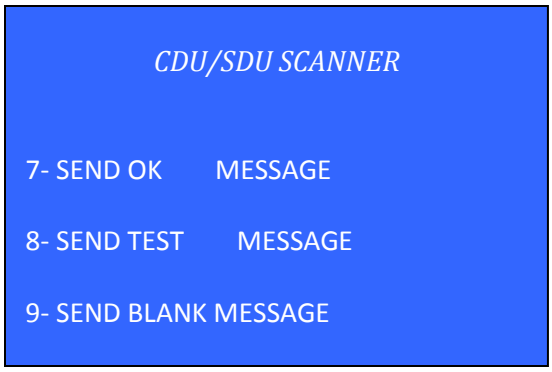
Press button “Next”, following message will appear:



Press button “3”. Following message will appear:



Now press “5” to use CDU/SDU to test Acive Hub on Display network, following message will appear.

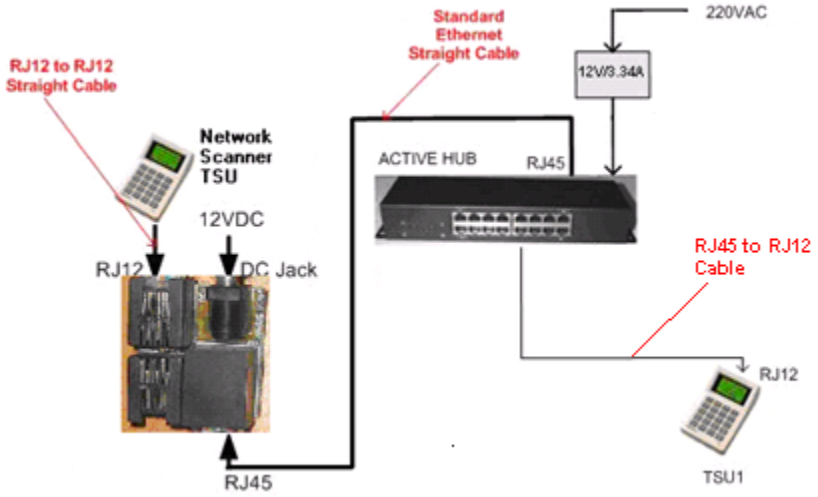


If ‘7’ is pressed a message ‘OK’ will appear on all connected Displays.
If ‘8’ is pressed a message ‘TEST’ will appear on all connected Displays.
If ‘0’ is pressed all the Displays will get BLANK.

In the same manner check all RJ45 Ports of Active Hub, by connecting the CDU’s to next four ports and send the message one by one.

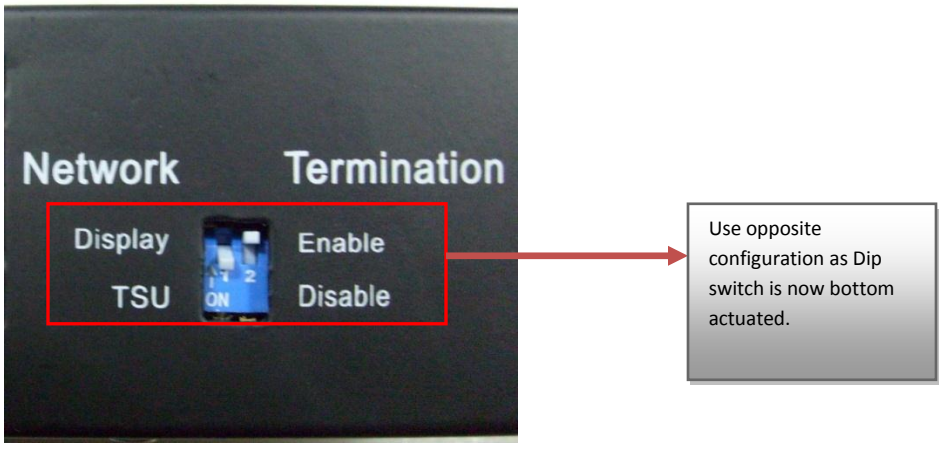
2. Testing Active Hub on TSU Networks Using IN Port:

After successful testing of Active Hub on Display network, remove the power to the Active Hub and change its DIP switch position to "TSU" and connect to the network of TSUs as shown in Figures below.



Testing Active Hub on TSU Network

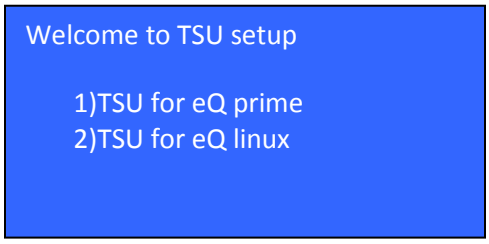
Dip switch setting for TSU Network:



When the TSU is connected with the network scanner PCB and the 12V DC adapter is inserted in the DC JACK of Network Scanner PCB, TSU will turn ON and the following screen will appear,

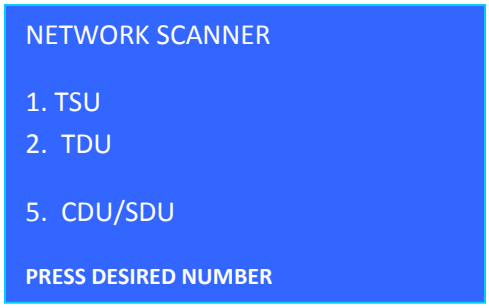
After few seconds following message will appear:

Then Press buttons 3 &4 together for at least 5 seconds or until following message is appeared.



Press button “Next”, following message will appear:

Press button “3”. Following message will appear:



PRESS button 1, following screen message will appear:

START ID = 01

6-UP 9-DOWN

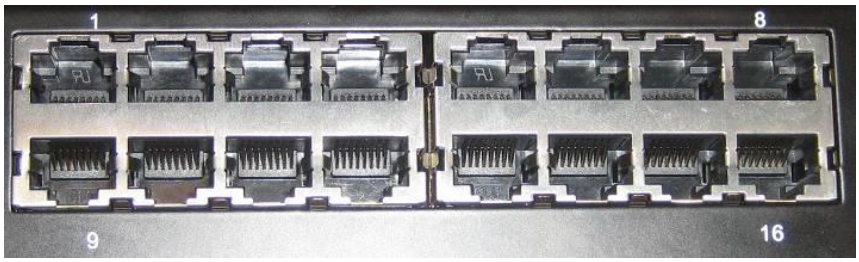
END ID = 22

7-UP 0-DOWN

NEXT/OK TO SCAN

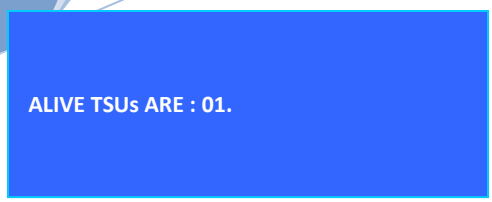
Above mentioned IDs number “START ID” and “END ID” is to scan number of TSUs connected with Active Hub, in above scenario Scan ids for TSU`s goes from 0 to 22.

We need to change “END ID” by pressing button “0” to decrease number of TSUs IDS and press button “7” to increase the number of TSUs IDS of TSU. In our case we need to change “END ID” to 16 because only 16 ports are available on the Active Hub.



However, we can increase number of ports of Active Hub. We are testing Active Hub with only one TSU. Connect TSU with the port 1 on Active Hub, as shown in following diagram:

Connect TSU with ID 1 to port 1 on active hub; for ID change follow the procedure of section VIII and press Next/OK on network scanner TSU to test Active Hub, following message will appear:



Note:

Don't need to test all ports on TSU network , one port test is fine.

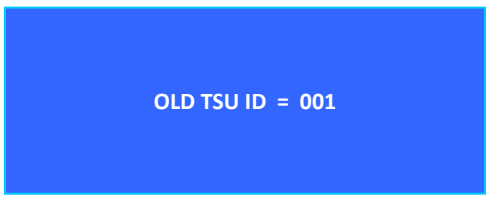
How to Change TSU ID's

Once inserted Following screen message will appear for few seconds:

After few seconds following message will appear:

TSU ID can be changed or configured by the following procedure:

Press button "1" and "2" together for few seconds or until following screen is appeared on TSU:



Press button "1" on TSU to increment the number of ID or Press button "5" to decrement the number of ID

Once ID number has been changed to desired ID number then press button "OK" on TSU.

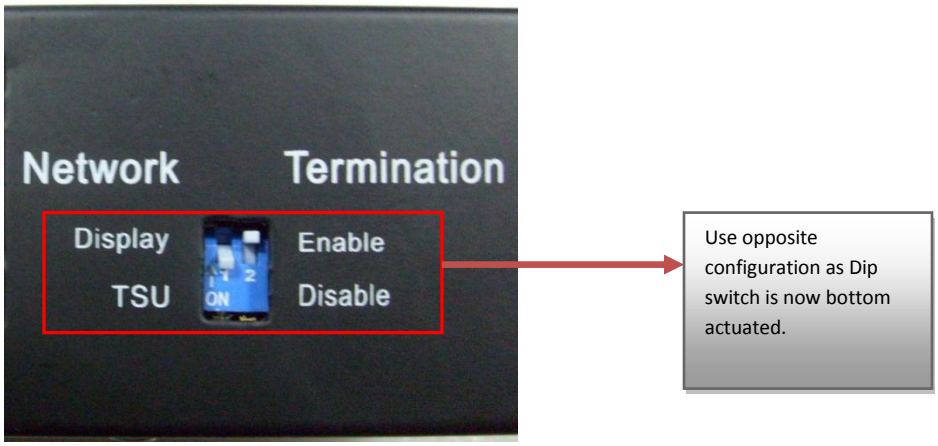
The above selected ID will appear on Network Scanner TSU when we scan the network.

3. Testing Active Hub on TSU Networks using OUT port:

Now remove the Cable from the "IN" of the Active Hub and put it into "OUT" of Active Hub and Test the Active Hub by following the procedure as described in section VII, we will get same result.

4. Test of Termination DIP Switch

A) Make sure **Termination** DIP switch is **Enable**. Now connect the RJ45 connector into "IN" of the Active Hub Port as shown in figure.



Connect the cable on IN port of the Active Hub as shown below.

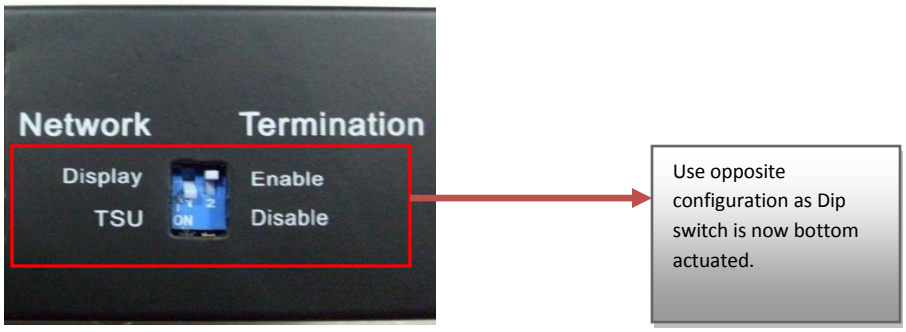
Then measure the resistance between Pin 3 and Pin 6 , the resistor value be 120 ohms as shown in the figure.

Now remove cable from “IN” and place cable into “OUT” of Active Hub as shown in the figure below:

Then measure the resistance between pin 3 & 6, the value should be 120ohms.

B) Set the **Termination** DIP switch to be **Disable**, then measure the resistance between Pin 3 and Pin 6 on Active Hub IN&OUT port, the resistor value should be infinite.

Must make sure to leave DIP setting to “Termination Enable” as shown below:



Packaging:

1- Packing list of parts/accessories

Following are the part needs to verify that these parts are included to every product, before the shipment of Active Hub.

SN	Item	Qty	Description	Remarks
1	Active Hub	1 piece		
2	Power Adapter	1 piece	Mean well Adapter GS40A12-P1J (without central power Active Hubs) **OR** Mean well Adapter AS-120P-12 (with central power Active Hubs)	
3	AC Power cord	1 each	British standard cord with fuse option	
5	Product Code Label	3 pieces	One on the Active Hub rare side, two on the Active Hub carton box.	With Wavetec Logo
6	ROHS Label	3 pieces	One on the Active Hub rare side, two on the Active Hub packing box.	
7	Green Product Label	3 pieces	One on the Active Hub rare side, two on the Active Hub packing box.	
8	QC Passed Label	1 piece	One on the Active Hub rare side	

2- Sticker Verification

Product Label for Active Hub (without Central Power)…… 701-0002-0000

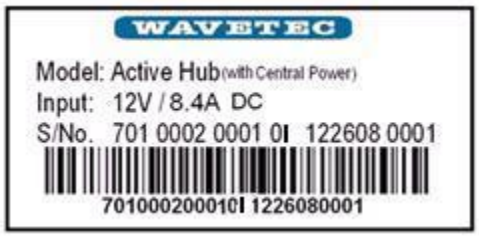
Following stickers needs to be pasted at the box of active hub.

Model	Active Hub(Without central Power)
Input	12V / 3.34A
Product ID	701 0002 0000
Rev Info	0K
Batch	MMDDYY(Month, Date, Year)
S/N	XXXX(from 0001 to 9999)
Barcode	Refer to Document number # 971-0001-0000

Qty: 2 pcs

Product Label for Active Hub (with Central Power)…… 701-0002-0001

Following stickers needs to be pasted at the box of active hub.



Model	Active Hub(Without central Power)
Input	12V / 8.4A
Product ID	701 0002 0001
Rev Info	0I
Batch	MMDDYY(Month, Date, Year)
S/N	XXXX(from 0001 to 9999)
Barcode	Refer to Document number # 971-0001-0000

Qty: 2 pcs

Product Label for Active Hub metal enclosure

Following stickers needs to be pasted at the back side of metal enclosure of active hub as shown in the figure below.

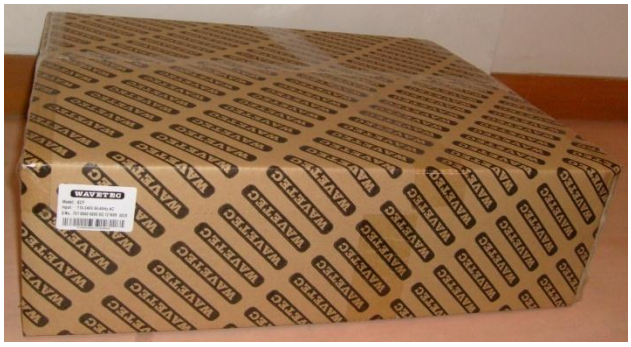
Model	Active Hub
Input	12V / 3.34A or 8.4A
Product ID	701 0002 0000
Rev Info	0L
Batch	MMDDYY(Month, Date, Year)
S/N	XXXX(from 0001 to 9999)
Barcode	Refer to Document number # 971-0001-0000

Qty: 1 pcs


WAVETEC
Model HUB-01
Input 12V/5A DC
S/No 0009 033108 02A 0054
Q.C. PASSED

3- Carton Box

- Make sure carton box should be neat and clean from inside and outside. **No stain from inside and outside**.
- Make sure shape of the carton box is uniform.
- Make sure printing should be clear and uniform as shown in the figure below. The color of Wavetec logo is Black (Not Gray)



4- Power Cord

Make sure Power cord should be wrapped in the bubble bag as shown in the figure below. Also make sure bubble bag used for the packing should be new one.


XIONGRUN
XR-501

5- Replaceable item Sticker

For without central power active hub Adapter

Paste this sticker on the power adapter before packaging. Enter the production date on the Batch number.

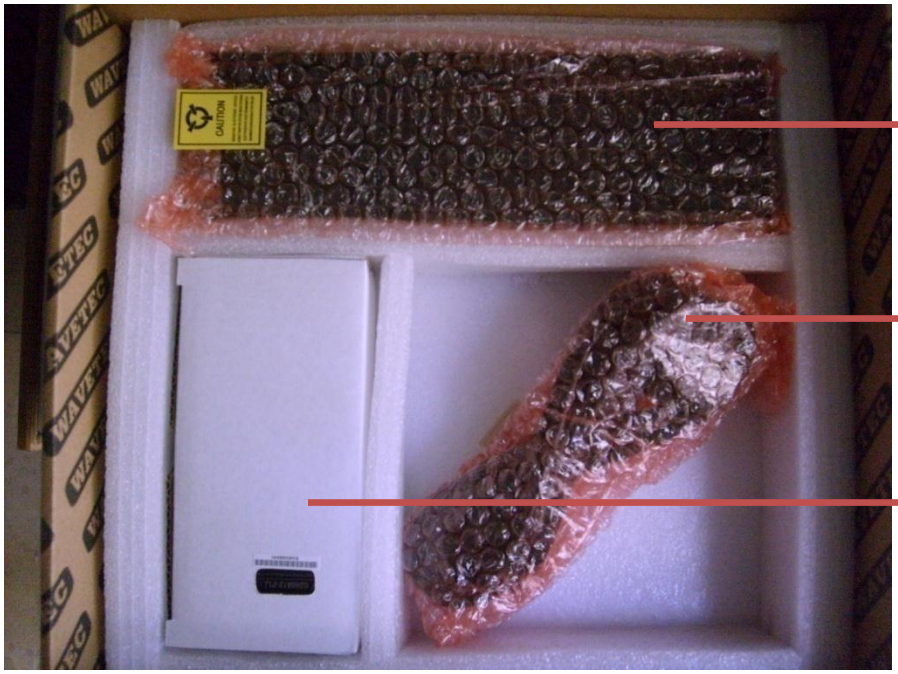
PLM# 499-0122-0000-0A
Batch: MMDDYY

For with central power active hub Adapter

Paste this sticker on the power adapter before packaging. Enter the production date on the Batch number.

PLM # 499-0104-0000-0A
Batch: MMDDYY

Packaging for Active Hub(without Central Power)



Packaging for Active Hub (with Central Power)

Check List for Test of 100% of the product

Following check list should be filled during the QC of the product. Take a print out of this checklist and filled it during the QC and after QC send a scan copy of filled checklist to Head Office with PO Number. To learn how to perform the below Testing and QC, see the relevant sections in the QC Guide.

Check List for 100% Test - PO #: _____ Date: _____

S/No.	Burn In Test	Power Recycling	Physical Inspection						Functional Test				Packaging			
			1- Sharp Edge	2- Color checking	3-Wavetec Logo	4-Critical Item part number verification	5-Text Printing	6-Jumper Setting	1-Display Networks	2-TSU Networks using IN Port	3-TSU Networks using OUT port	4-Termination DIP Switch	1- Packaging List	2- Sticker	3- Carton Box	4- Power cord

Name:_____

Signature:_____

Test required for 1% of the product:

Take the printout of BOM of Active Hub of same revision number which is written on the P.O. Now perform the following tests.

Following test needs to perform on Main controller PCB (PT0012M). **Must take out 1 unit randomly from the burn In Test and do the following test.**

Component Verification

1- IC's / Diodes Verification

IC's:

All IC's numbers are written on the top of IC, verify all the IC's with the PLM BOM.

Diode:

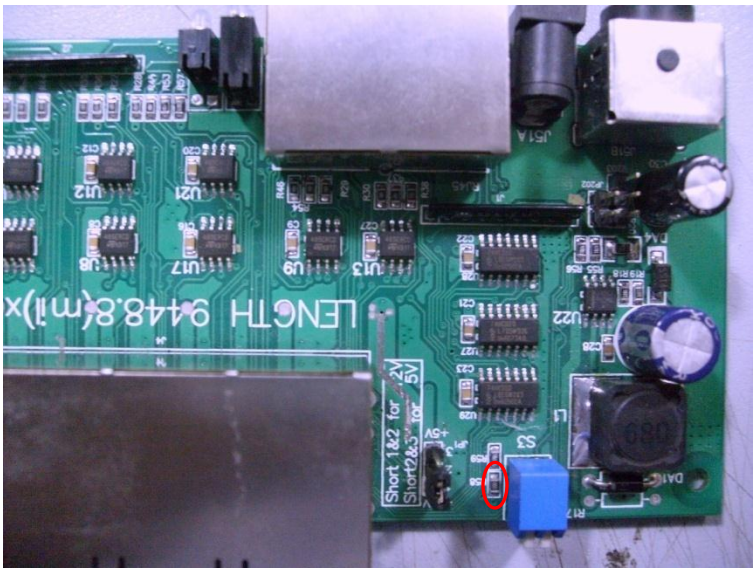
All diode numbers are written on the case diodes, verify diode number with the PLM BOM.

2- Resistor Verification

For all resistor needs to measure the resistance with the help of multi meter and compare it with the BOM. Don't need to de-solder, the value found on the meter will be approximate.

For Resistor **R58** on main controller PCB, they are specified for 1% tolerance. Hence de-solder them and take them out. And Measure with the multi meter. The value should be

R1 = 120 ohms (In between 118.8 ohms to 121.2 ohms)



3- Capacitor Verification

Electrolytic Capacitor:

All electrolytic capacitor can be verified visually, values are written on the capacitor.

C29, C30 are 470uf/25V.

Ceramic Capacitor:

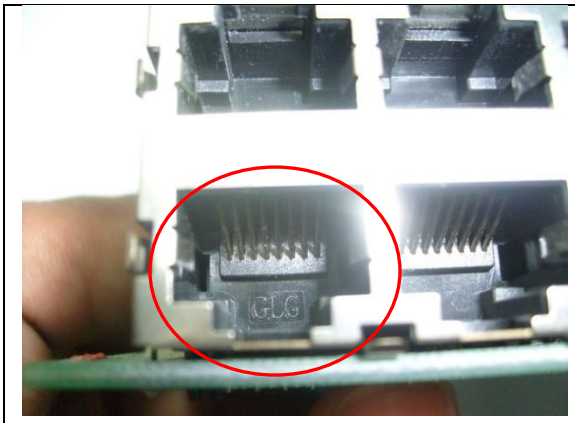
C1, C2, C3, C4, C5, C6, C7, C8, C9, C10, C11,C12, C13, C14, C15, C16, C17, C18, C19, C20, C21, C22, C23, C27, C31, C32, C33 are 0.1uF capacitor randomly de-solder 2 capacitors and measure the value with the help of LRC meter and for other just visually verify that they are of same package.

C26, CE1, CE2, CE3, CE4 are 10uf tantalum capacitor randomly de-solder one capacitor and measure the value with the help of LRC meter and for other just visually verify that they are of same package.

In the same manner check all the ceramic capacitors, if it is used in multiple location than only de-solder one capacitor and other visual verified.

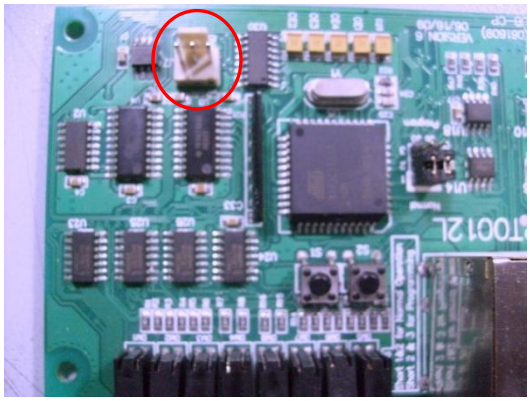
4- Connector verification

Check all RJ45 block connector used in main controller PCB (PT0012M), inside of all connector **"GLG"** should be written as shown in the figure below.



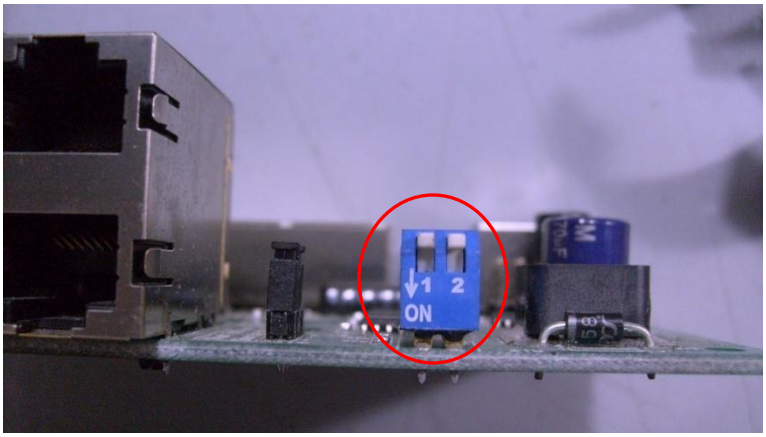
RJ45 Block Connector used in Main controller PCB

Make sure on the programming connectors of Main Controller PCB should be 2.54mm pitch as shown below.



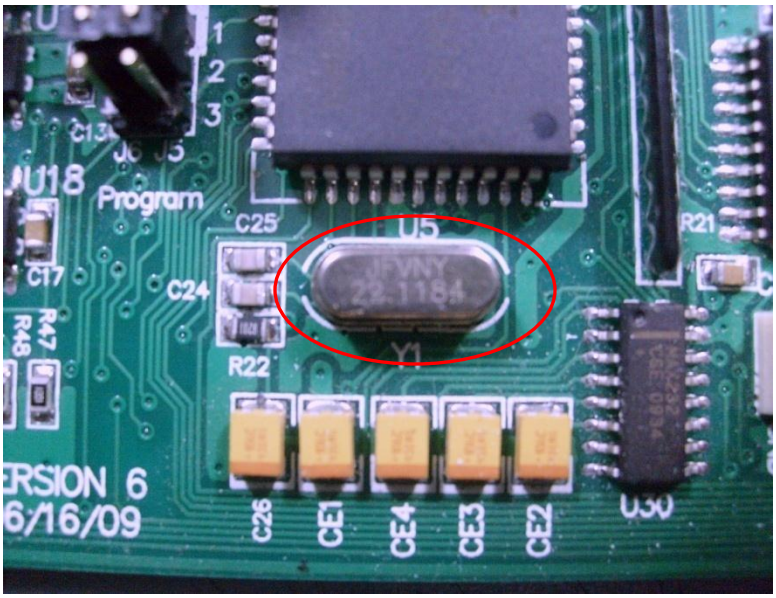
5- Dip Switch

Make sure Dip switch should be piano style and bottom actuated (Arrow should pointing in downward direction).



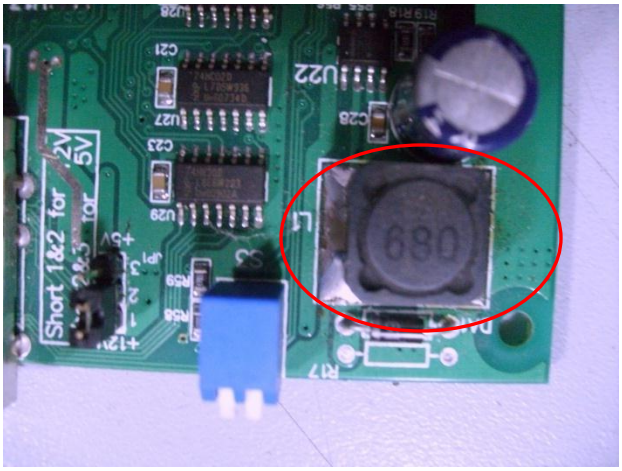
6- Crystal

Make sure crystal used in main controller PCB should be 22.1184MHz (written on the casing).



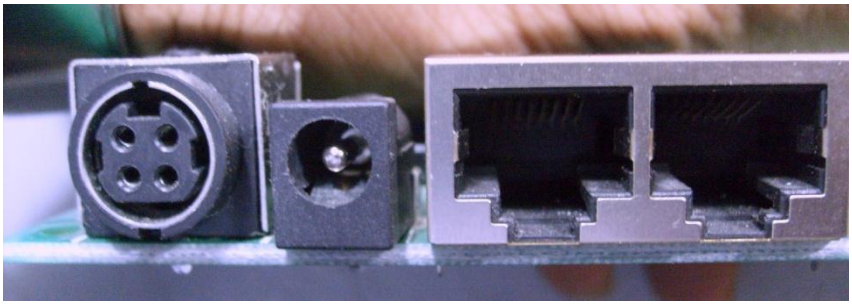
7- Inductor

Make sure should be of 68uH as shown in the figure below.



8- DC Jack

Make sure DC jack should be of 2.1mm pin diameter as shown in the figure below.

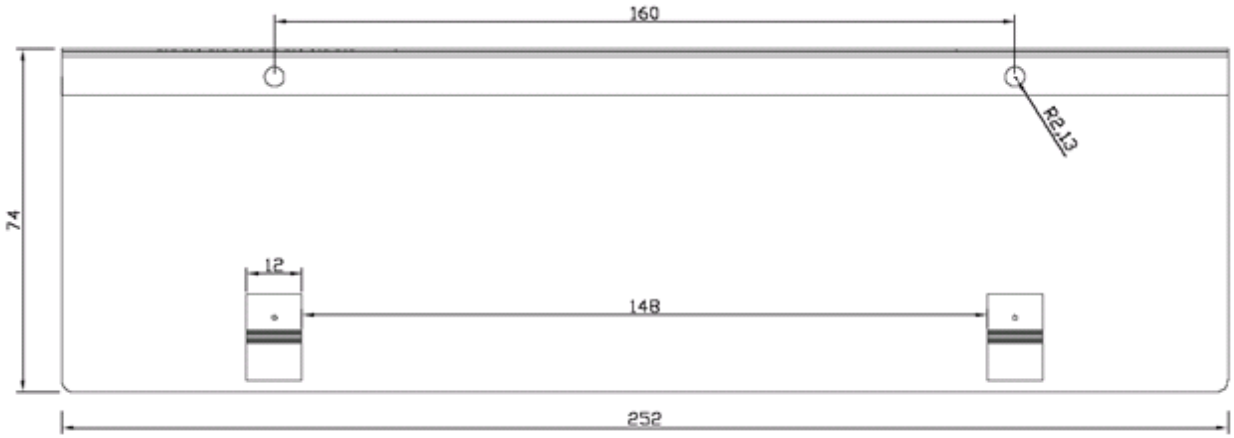


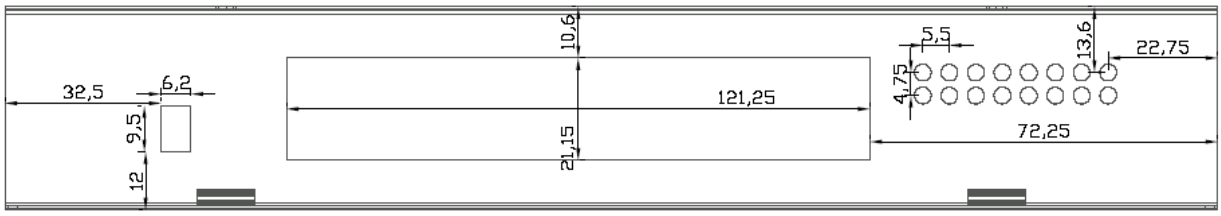
9- Metal Casing Dimension verification

Verify the dimension of metal casing as per drawing below.

Top casing

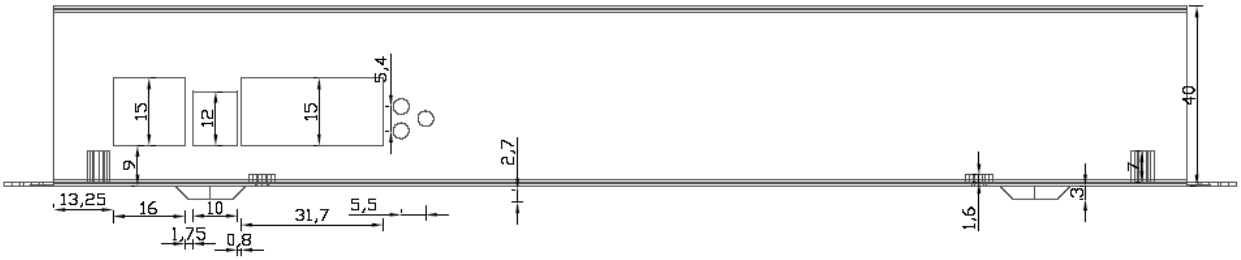
Make sure thickness of the casing is 0.8mm

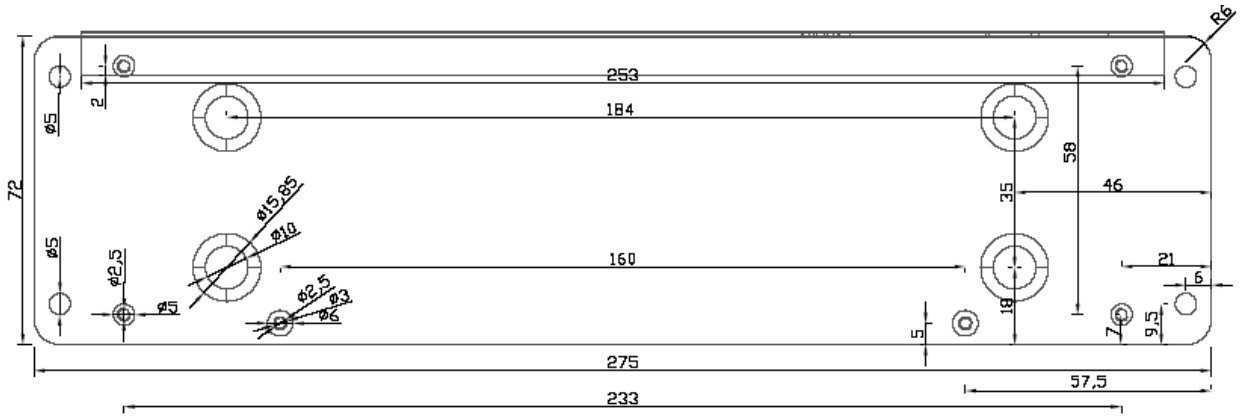




Bottom Enclosure

Make sure thickness of the casing is 0.8mm





Check List for 1% Test required of the Product

Following check list should be filled during the QC of the product.

Take a print out of this checklist and filled it during the QC and after QC send us scan copy of filled checklist.

Warning:

This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) this device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation. changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

NOTE: This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation.
If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:
-- Reorient or relocate the receiving antenna.
-- Increase the separation between the equipment and receiver.
-- Connect the equipment into an outlet on a circuit different
from that to which the receiver is connected.
-- Consult the dealer or an experienced radio/TV technician for help.