



Sistema de Recaudo Control e Información y Servicio al Usuario Project

Maintenance and Repair Manual (Heavy)

Automatic Recharger

CB-EDR-HM-00-V1.0



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Maintenance and Repair Manual (Heavy)						

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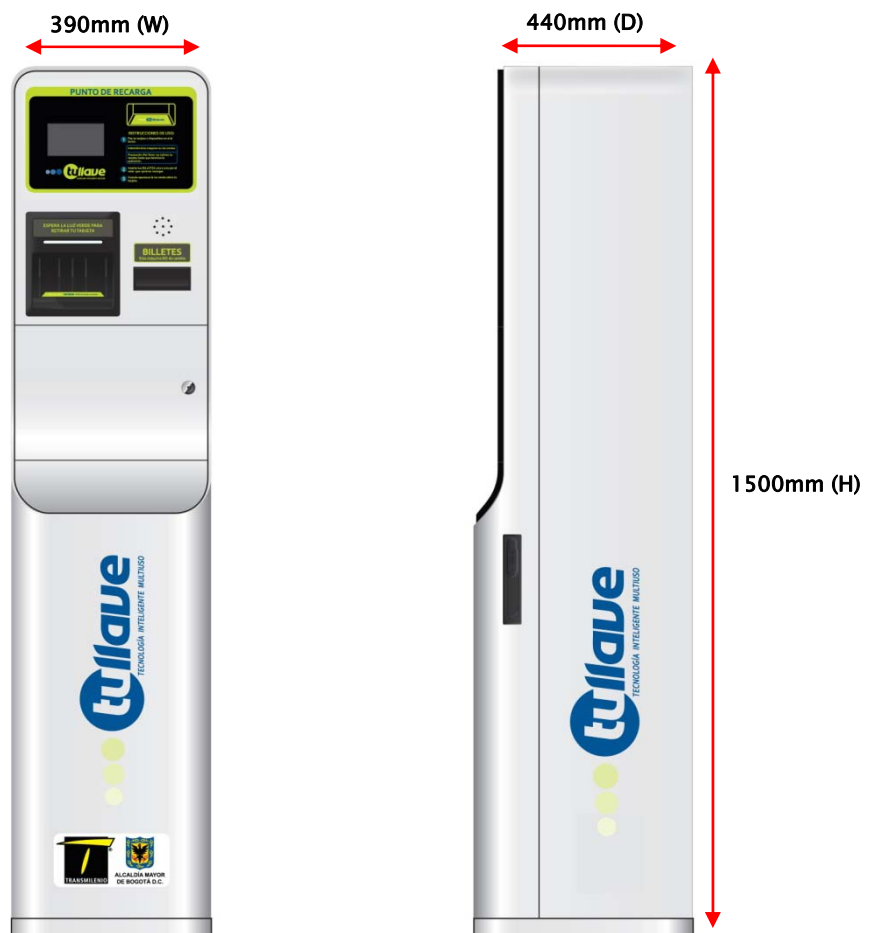
1. Automatic Recharger Equipment Structure

1.1 Overview

The Automatic Recharger is recharged the transit card.

1.2 External / Internal Structure and Main Module

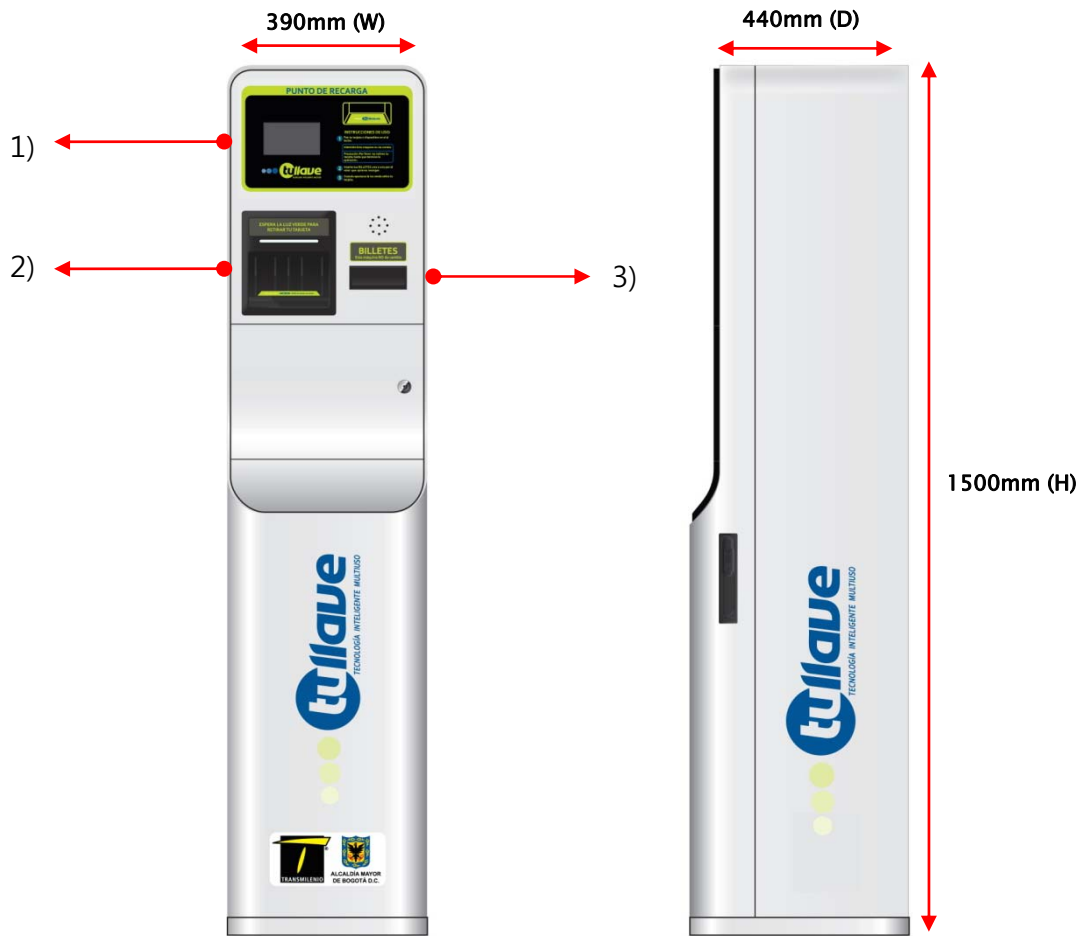
1.2.1 External Structure



[Automatic Recharger]

Division	내 용
Size	440mm(D) x 1500mm(H) x 390mm(W)
Material	BASE PLATE(SUS), Exterior (STEEL, Painted_SLIVER)

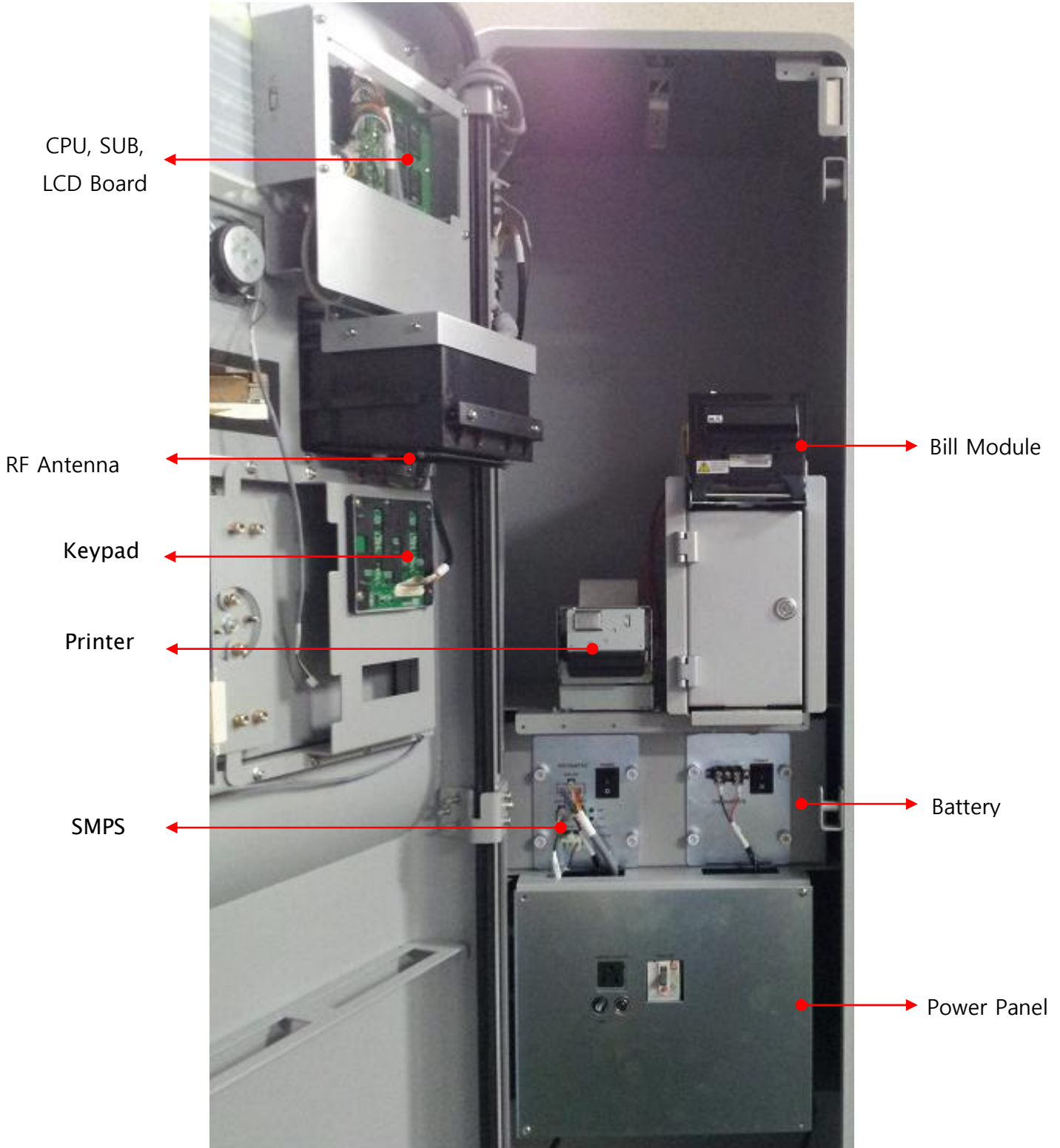
1.2.2 Main Module Structure I



Automatic Recharger

Name	Explanation
1) 4.3' LCD	Display of operation information
2) RFID Antenna	ISO14443 Type A, 13.56MHz card recognition and charging
3) Bill Module	6 varieties of colombia bill Insert each 1 bill

1.2.3 Internal Structure



1.2.4 Main Module Structure II

1) Printer Module

Print daily closing , accounting statement.

2) RFID Antenna

13.56MHz RF Card
ISO 14443 Type A

3) CPU Board

Control all attached equipment of Automatic Recharger and transfer data to main server.

- CPU
 - S3C2440(ARM9 Core) : 400MHz
- Memory
 - SDRAM : 128MByte
 - Nor : 8MByte
 - Nand : 512Myte
- RF Module
 - RC531(Type A)

4) Sub Main Board

Control I/O communicating CPU Board.

- Exterior PORT
 - Ethernet : 1
 - USB : 1
 - RS -232 : 5
- SAM
 - Socket 4EA(SIM Type)
- Sound
 - SW Codec controal
 - Speaker : 5W * 1

5) I/O Board

Control I/O communicating CPU Board and Sub Main Board.

6) Bill Module

: Recognize 6 varieties of Colombian Bill.

7) SMPS

: AC 110V, DC24V, DC12V

8) Battery

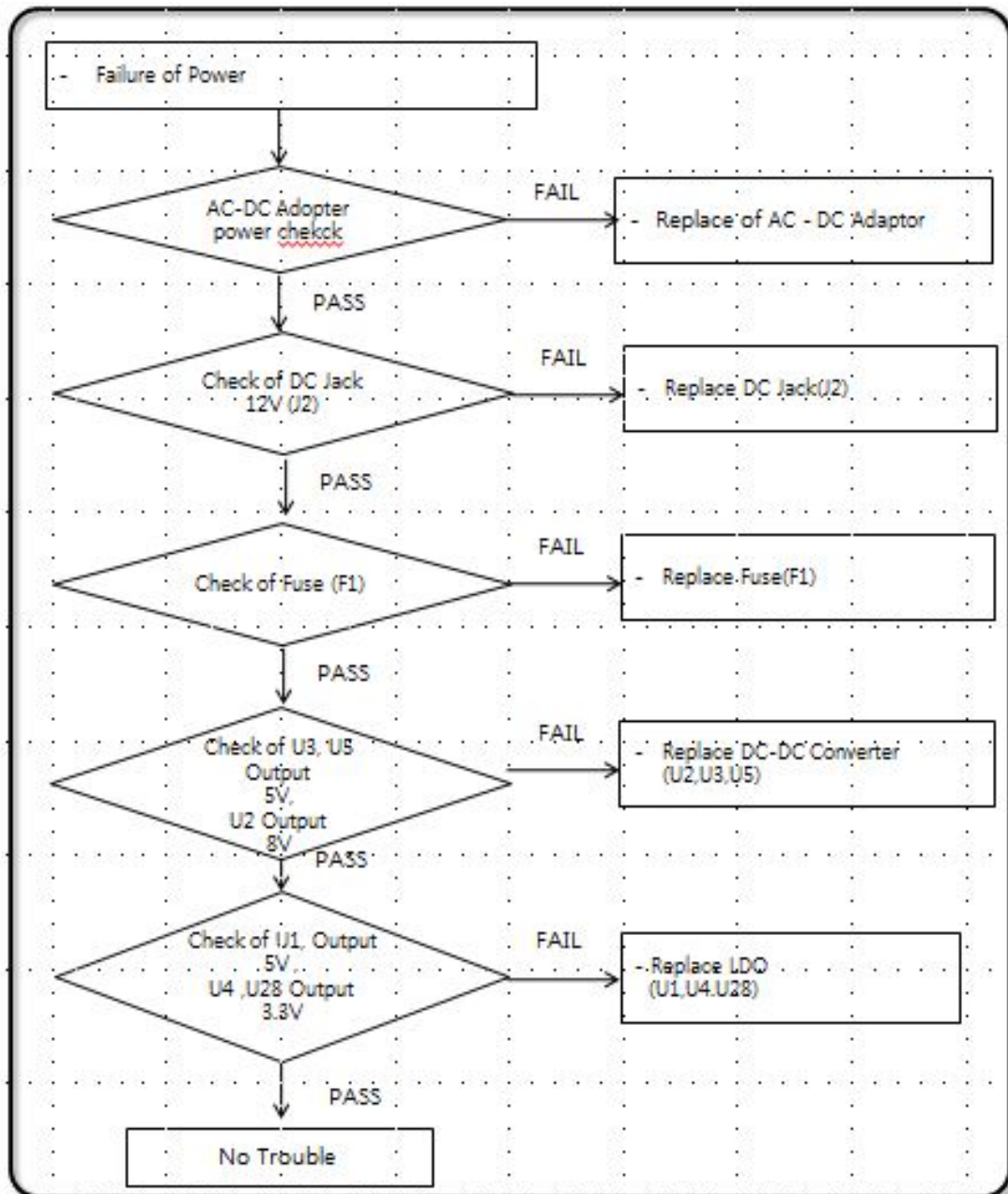
: Operate for 2 minute by using SMPS sub power.

9) Power Panel

: Input AC120V, output AC120V

2. Error Handling

2.1.1 Supply of the power (1/3)



2.1.2 Power Supply (2/3)



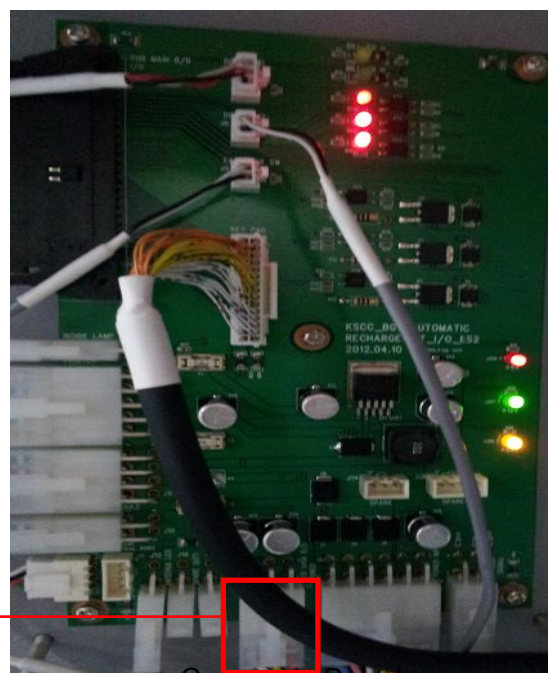
Output Voltage
AC 110V
Check

<Power Panel>



Output Voltage
DC12V Check

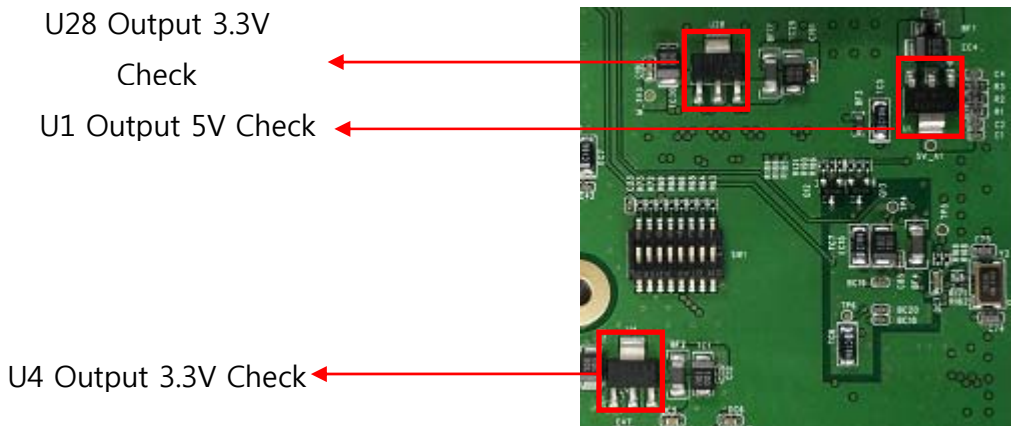
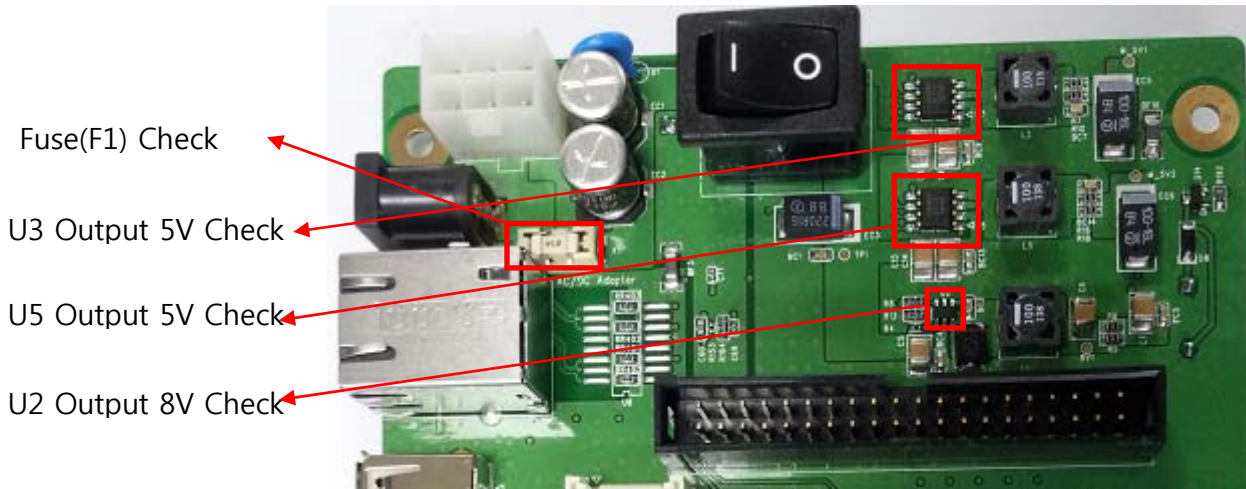
<SMPS>



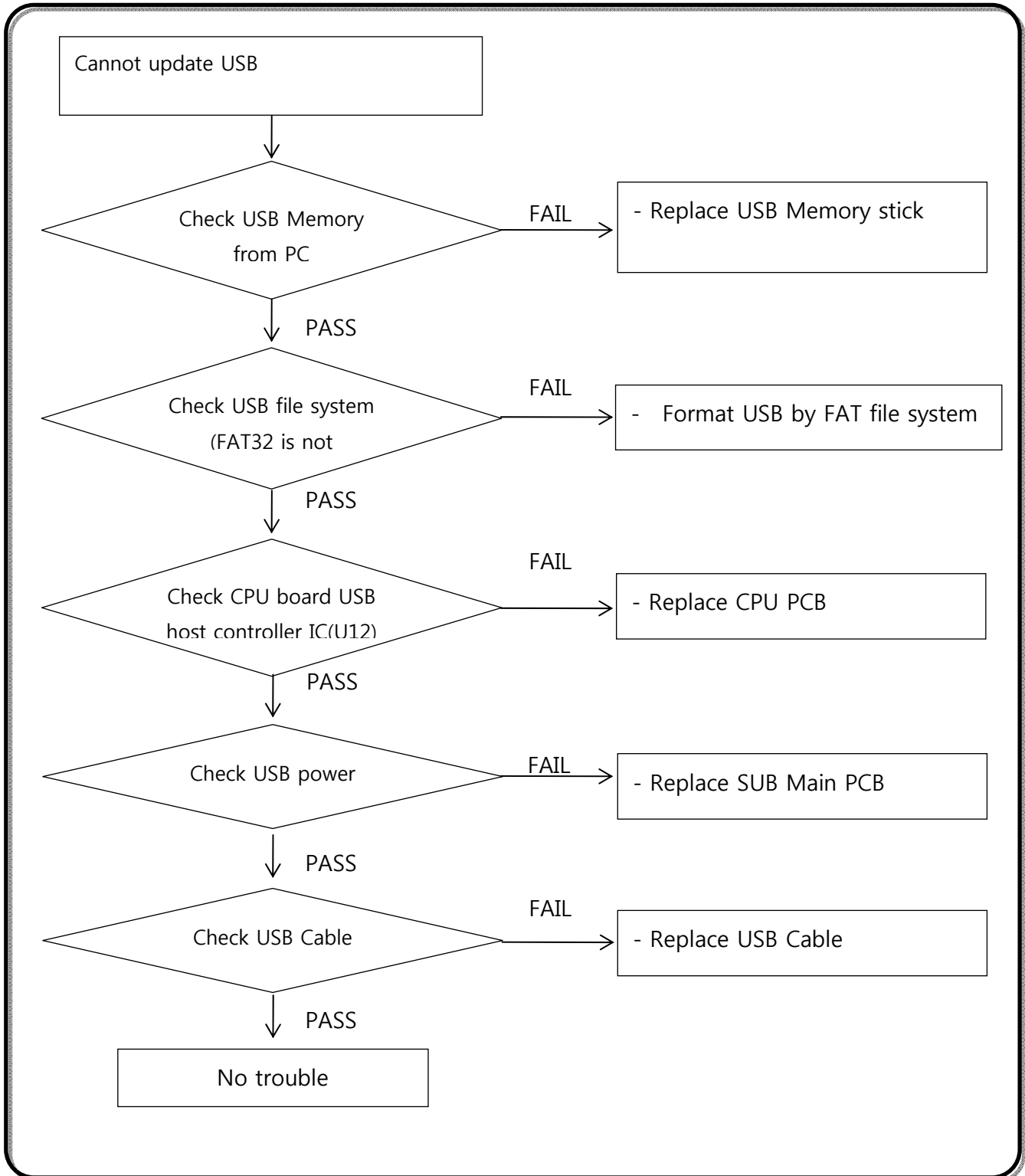
Output Voltage
DC12V Check

<Connector Board>

2.1.3 Power Supply (3/3)

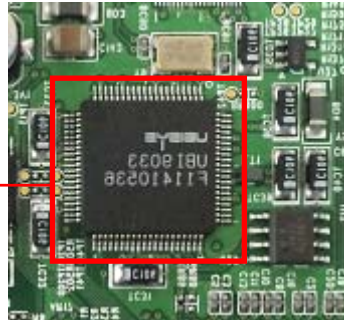


2.1.4 USB Trouble (1/2)



2.1.5 USB Trouble (2/2)

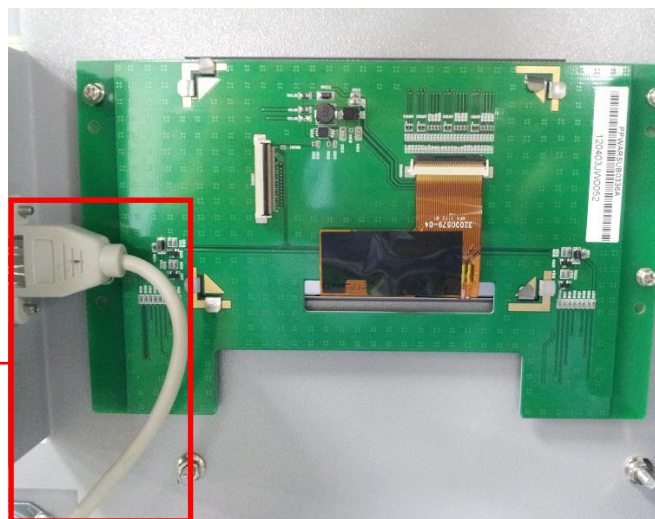
Check of U21 USB Controller



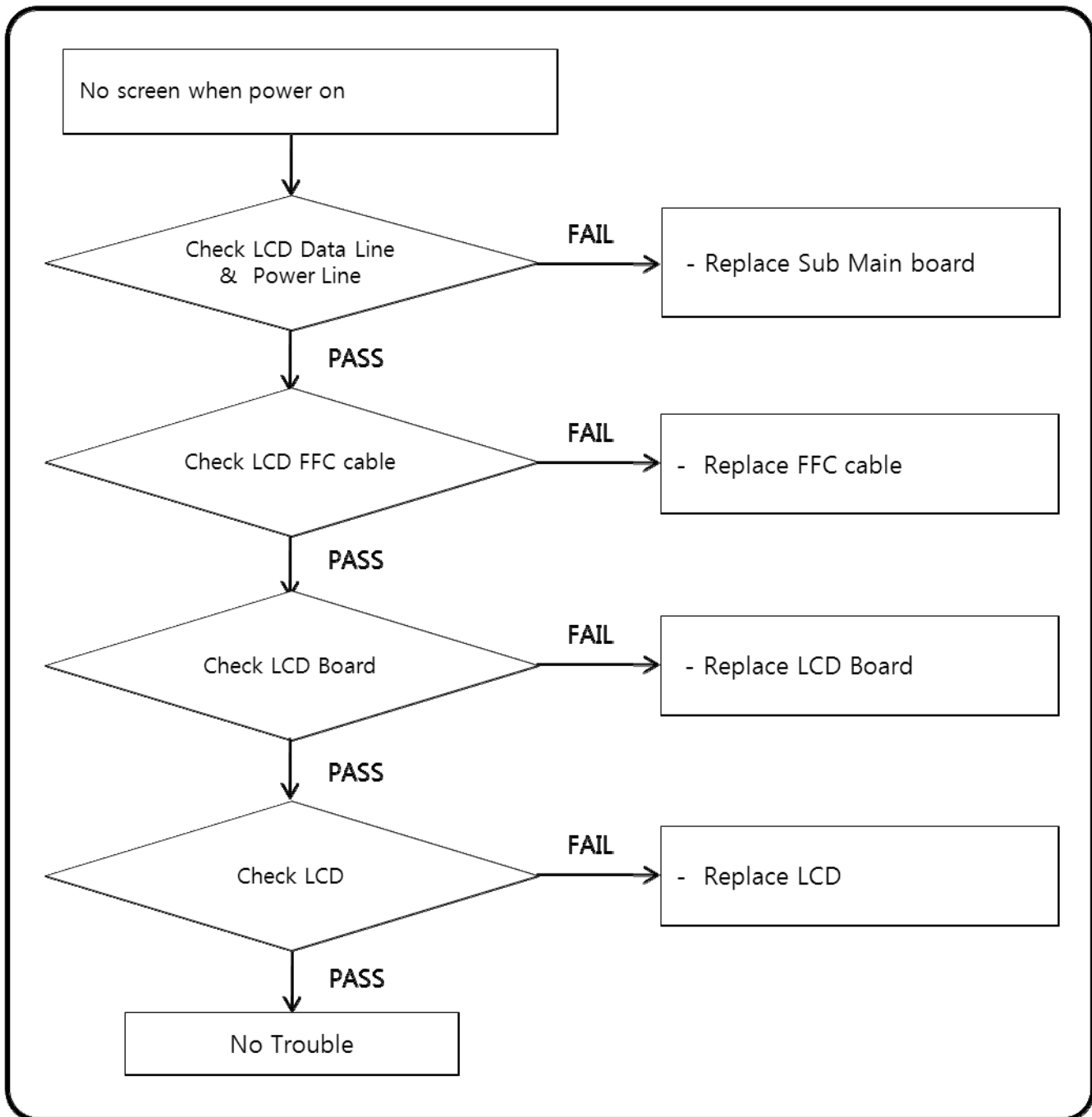
Check USB Power Pin No. 1 5V



Check USB Cable

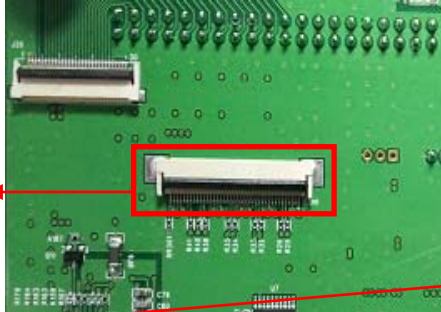


2.1.6 LCD Screen Trouble (1/2)

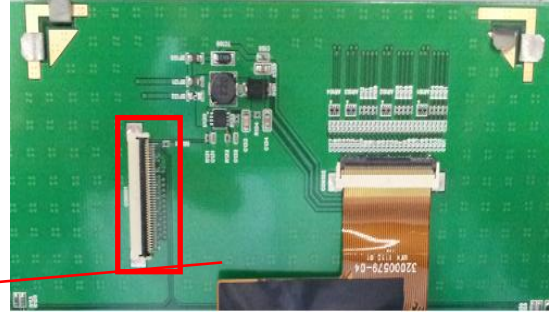


2.1.7 LCD Screen Trouble (2/2)

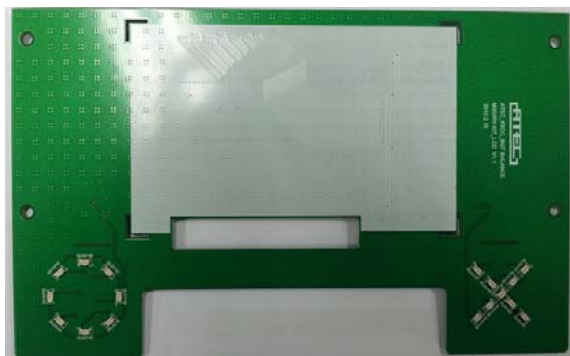
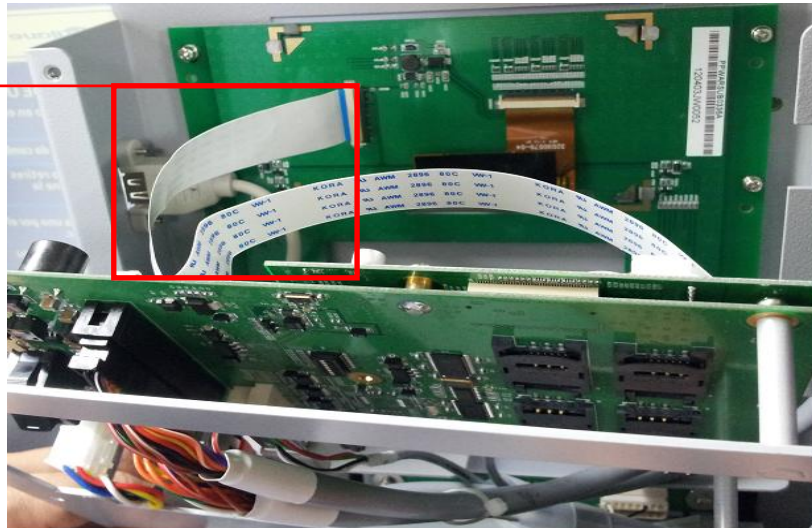
Check LCD Data & Power Line (Sub Main)



Check LCD Data & Power Line (LCD B/D)



Check LCD FFC Cable

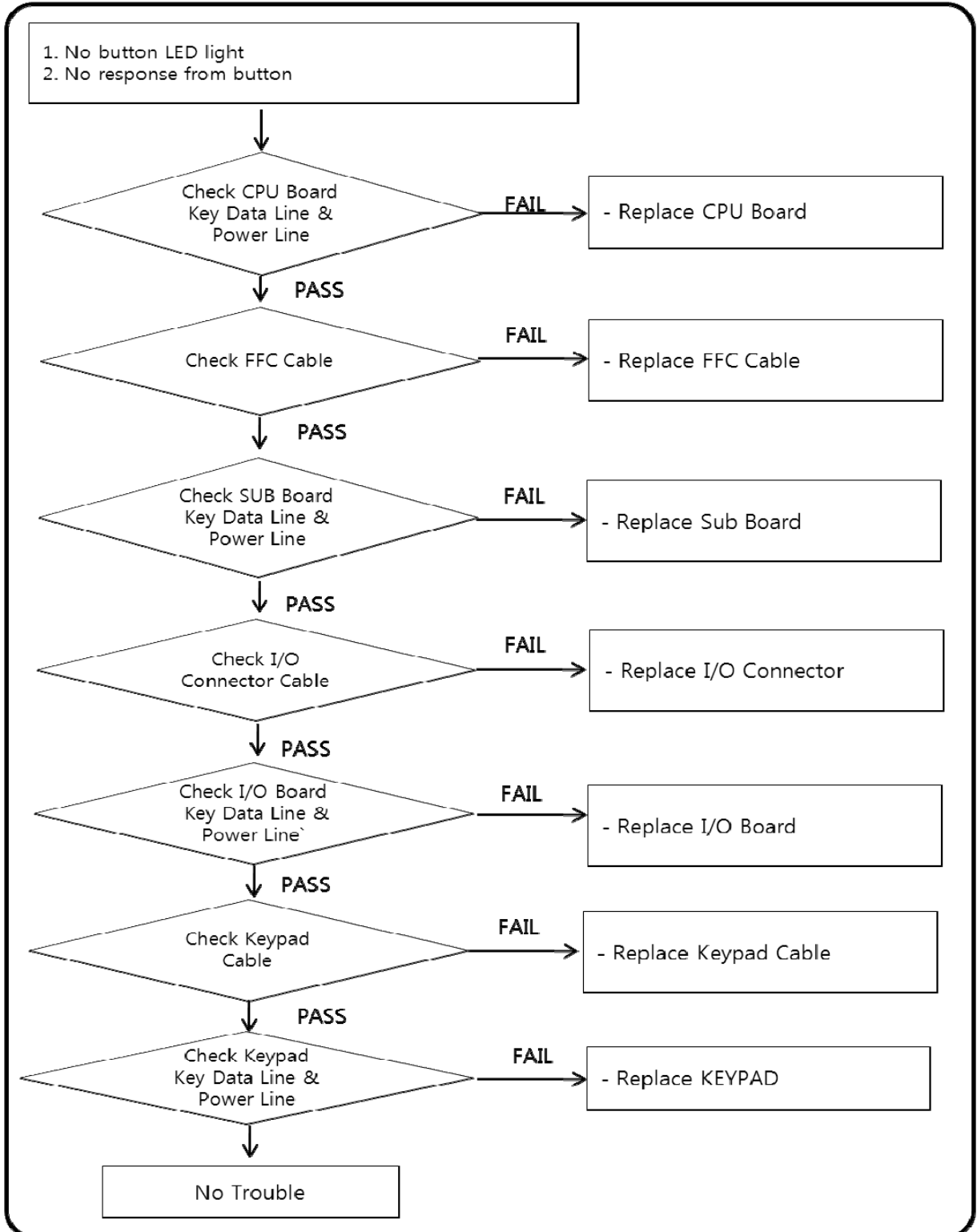


Check LCD Board



Check LCD

2.1.8 Keypad Trouble (1/2)

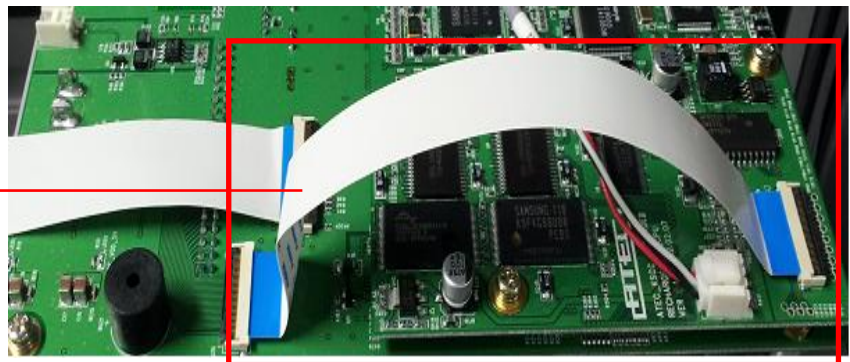


2.1.9 Keypad Trouble (2/3)

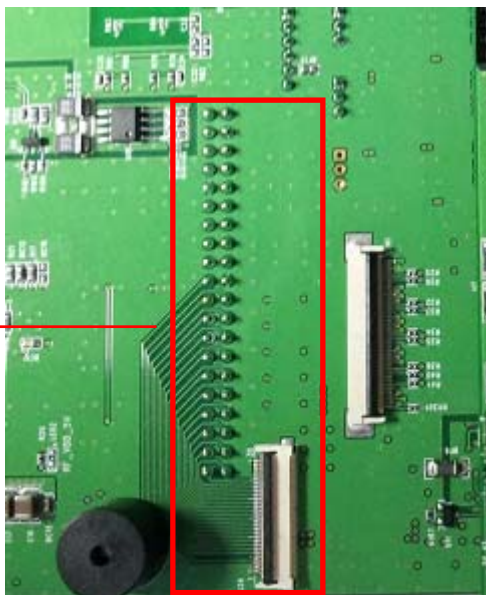
Check CPU Board
Key Data Line
& Power Line



Check FFC
Cable



Check SUB Board Key
Data Line & Power
Line

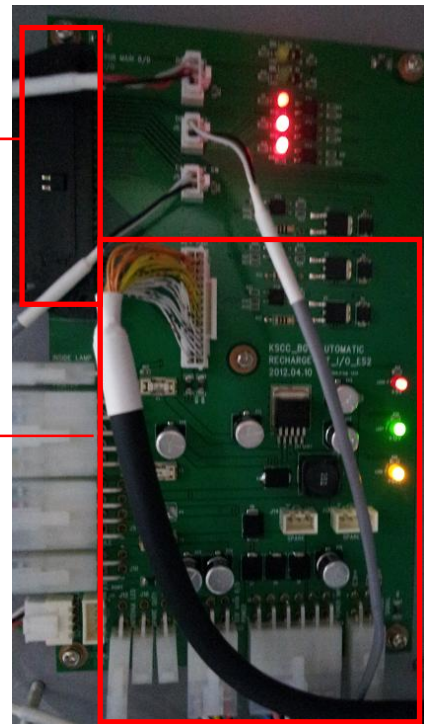


2.1.10 Keypad Trouble (3/3)

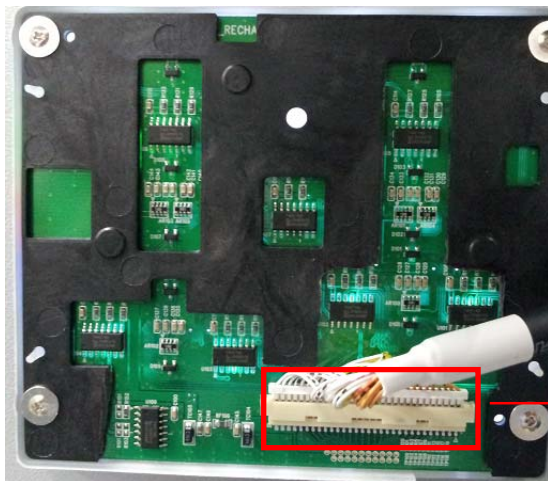
Check I/O
Connector Cable



Check I/O Board
Key Data Line &
Power Line

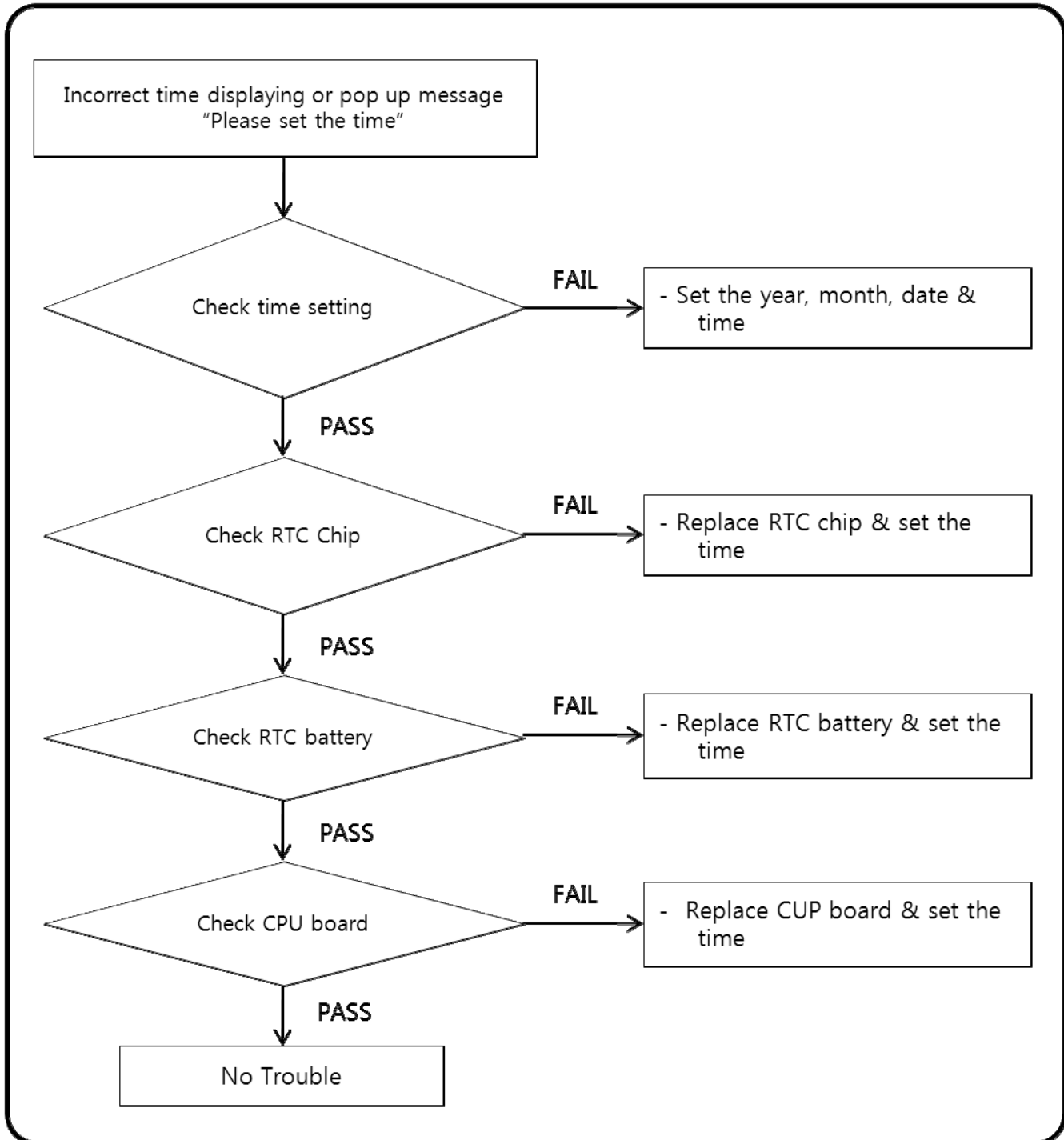


Check Keypad
Cable

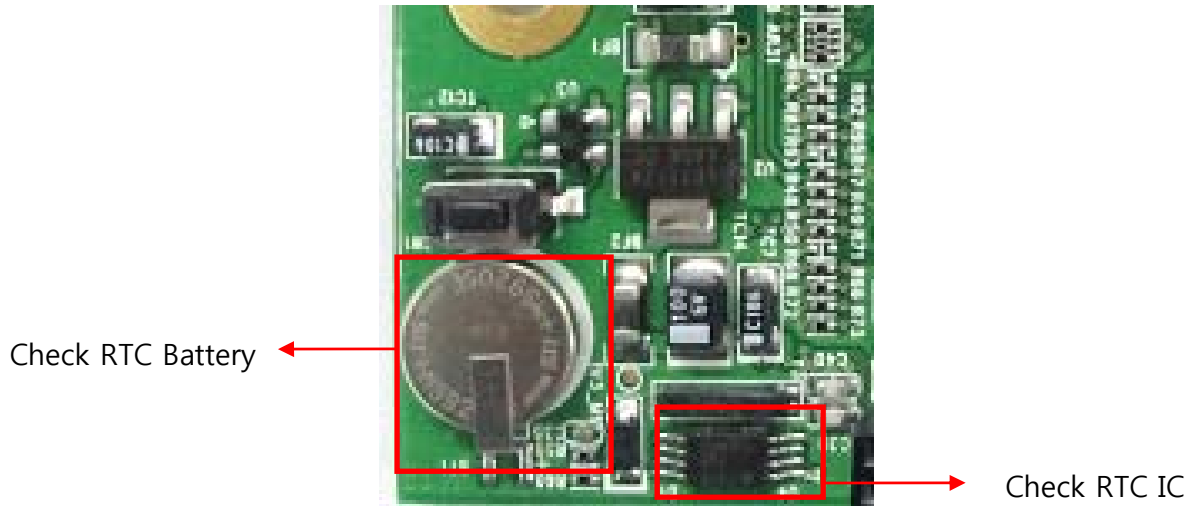


Check Keypad
Key Data Line &
Power Line

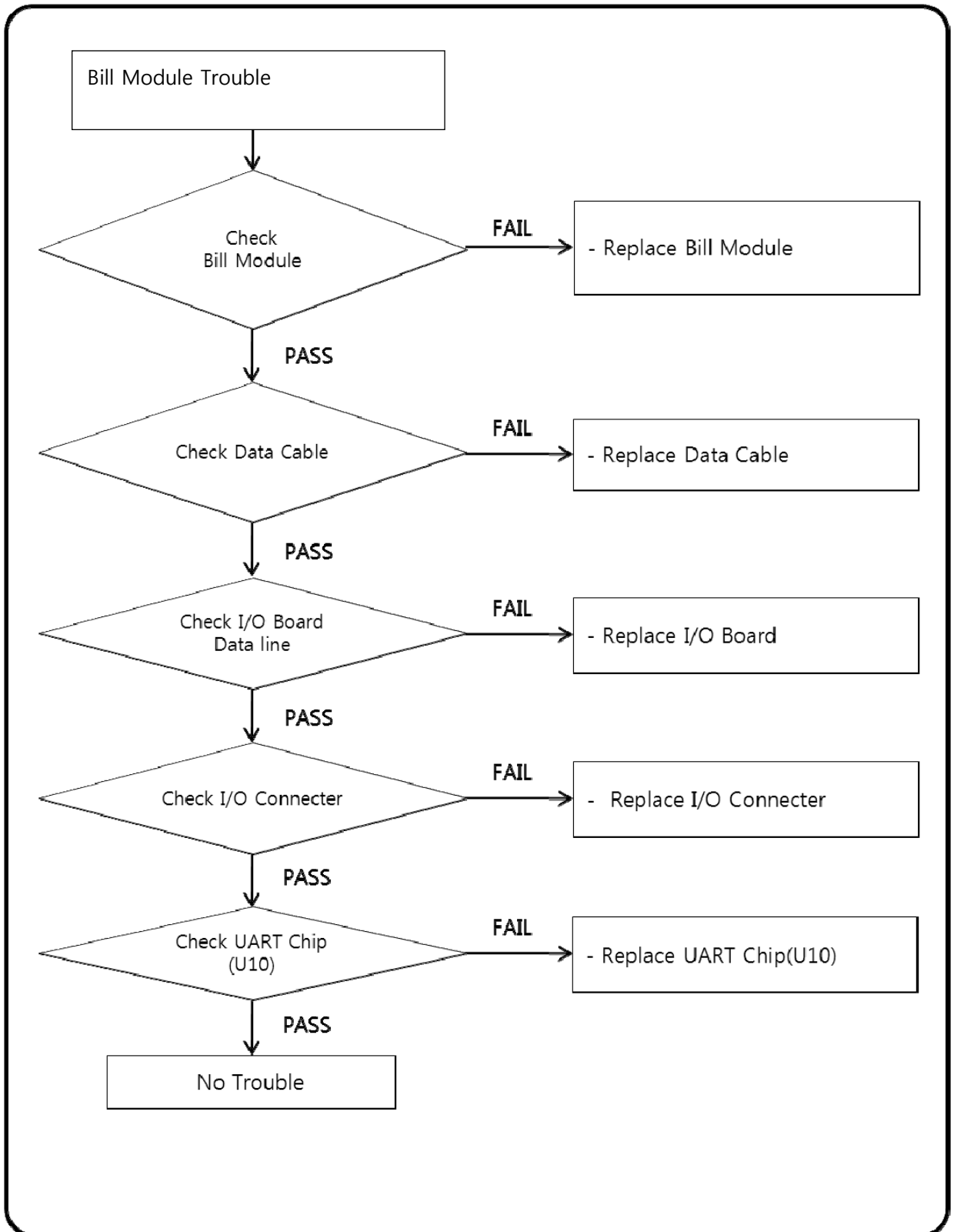
2.1.11 RTC Trouble (1/2)



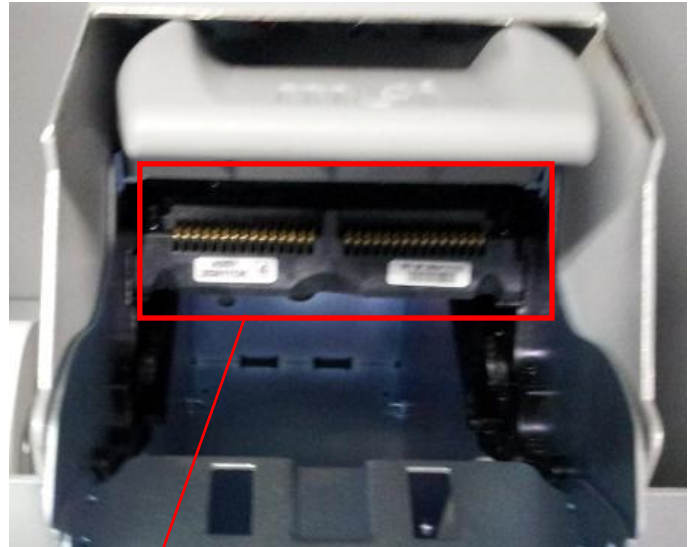
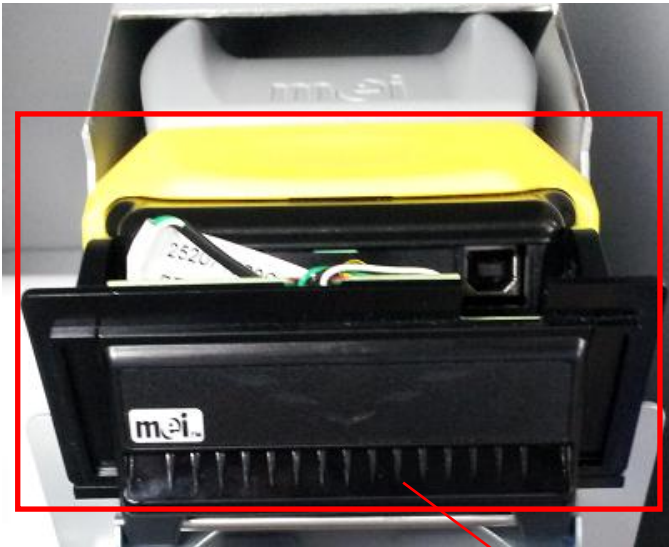
2.1.12 RTC Trouble (2/2)



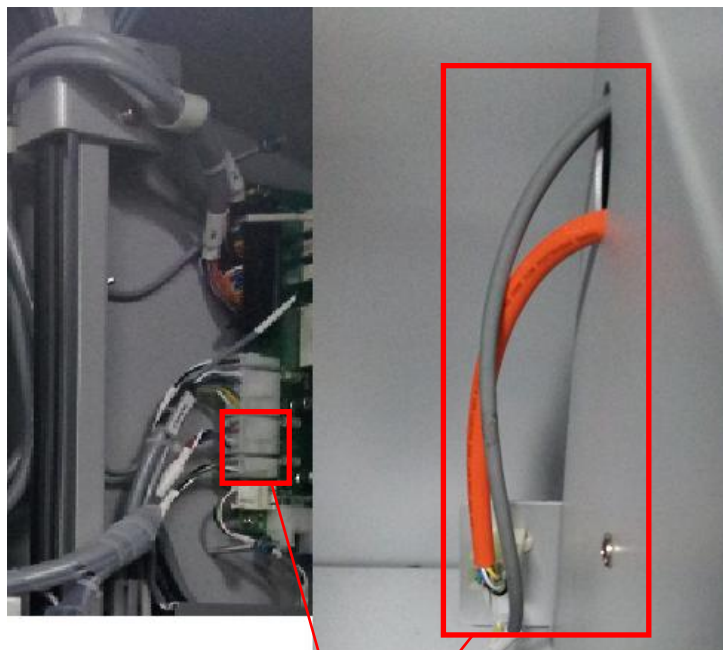
2.1.13 Bill Module Trouble (1/3)



2.1.14 Bill Module Trouble (2/3)



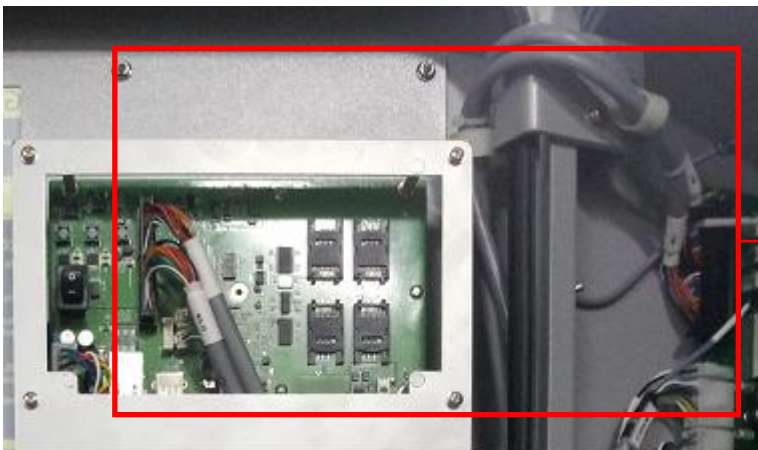
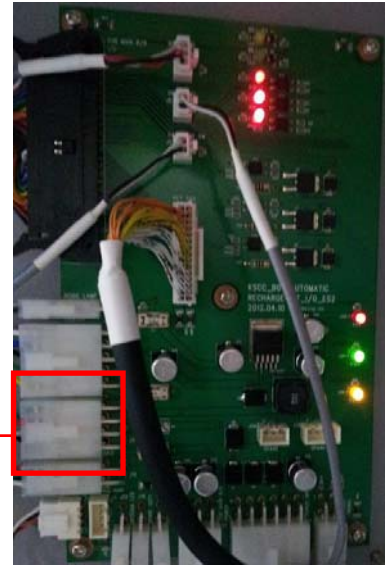
Check Bill Module



Check Data Cable

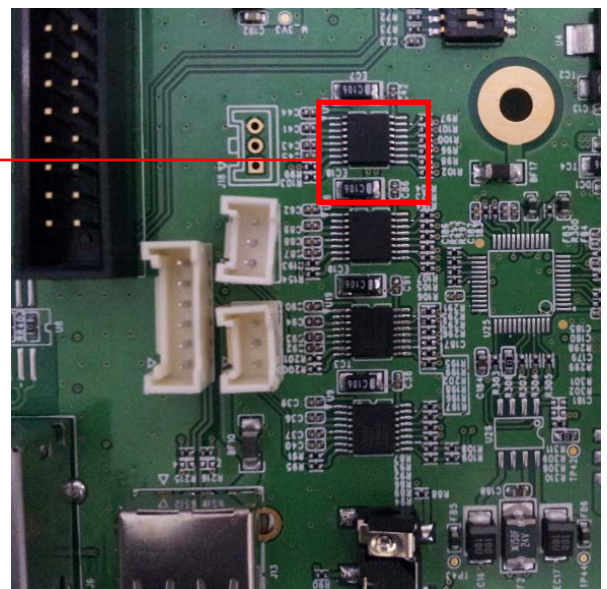
2.1.15 Bill Module Trouble (3/3)

Check I/O Board
Data line

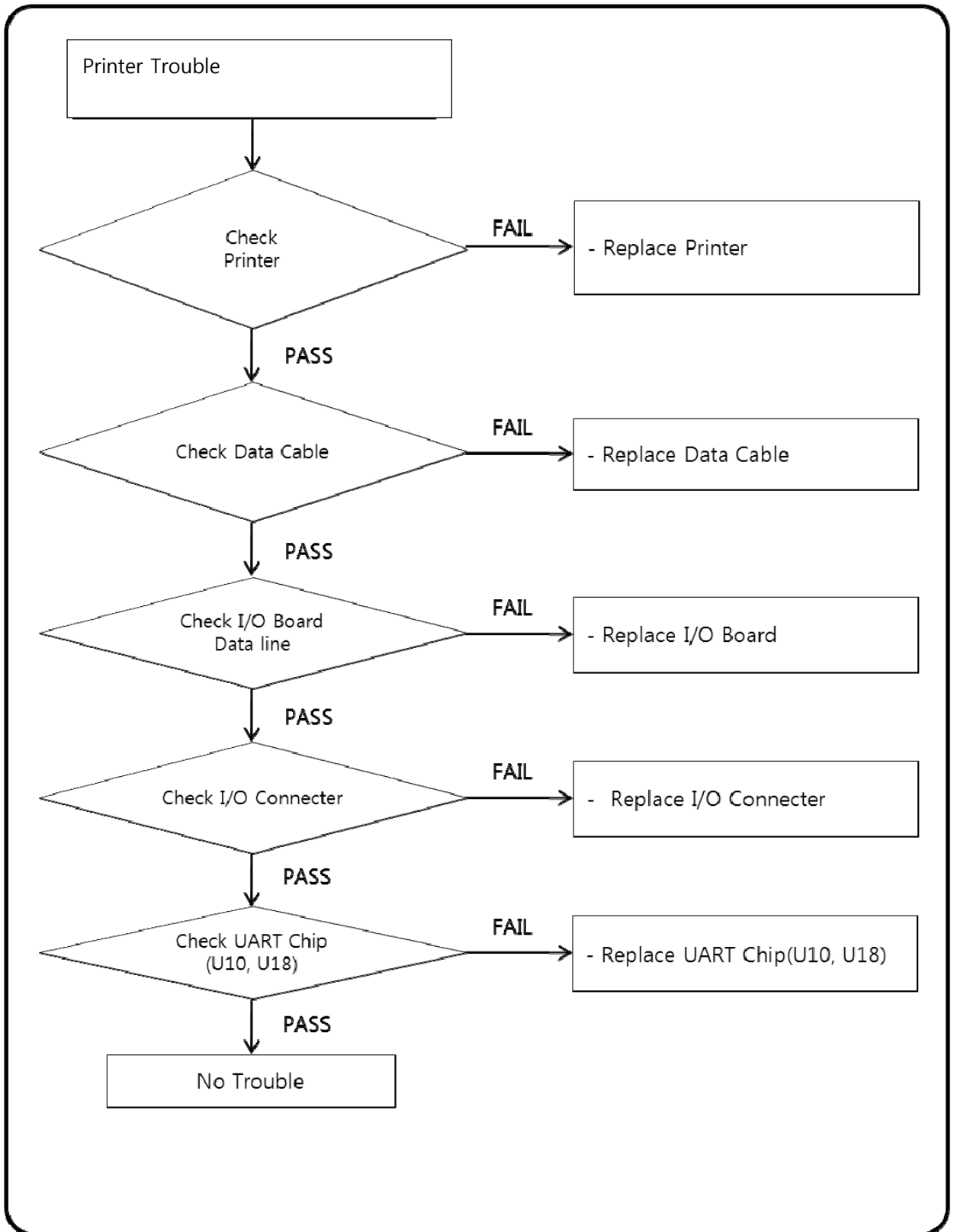


Check I/O Connector

Check UART Chip
(U10)



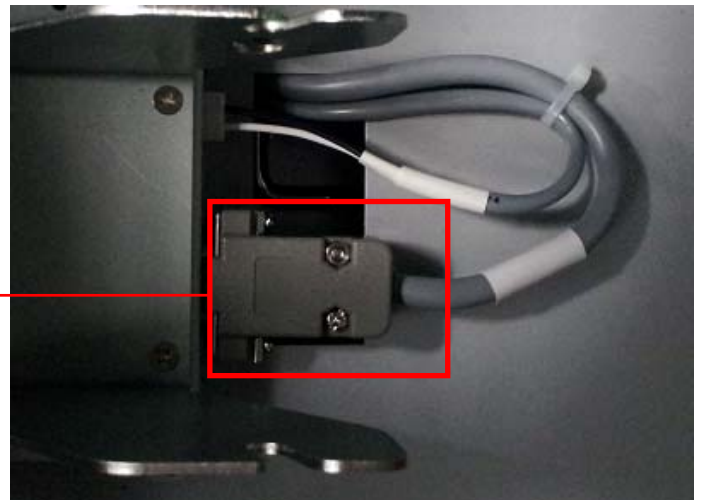
2.1.16 Printer Trouble (1/2)



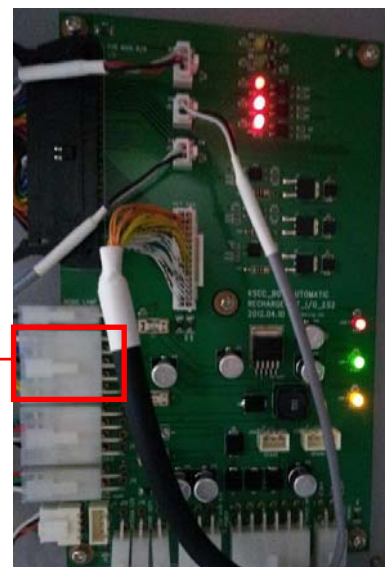
2.1.17 Printer Trouble (2/3)



Check Printer

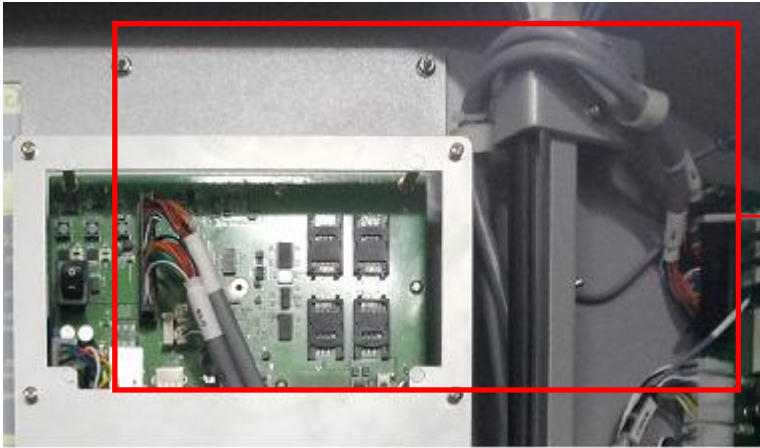


Check Data Cable



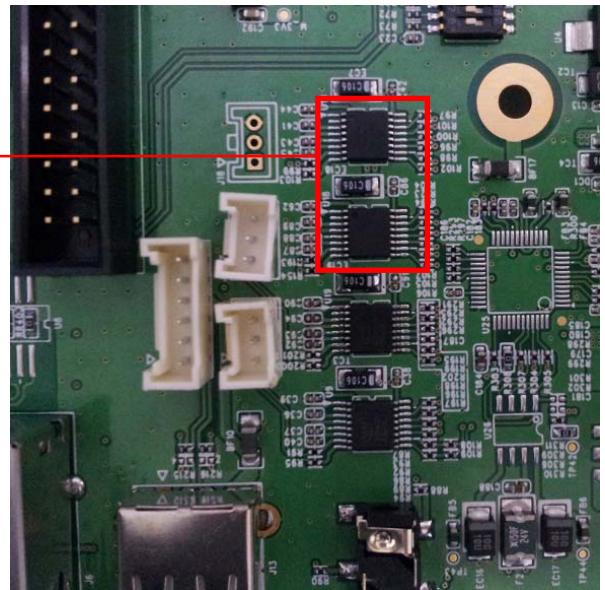
Check I/O Board
Data line

2.1.18 Printer Trouble (3/3)



Check I/O Connector

Check UART Chip
(U10, U18)

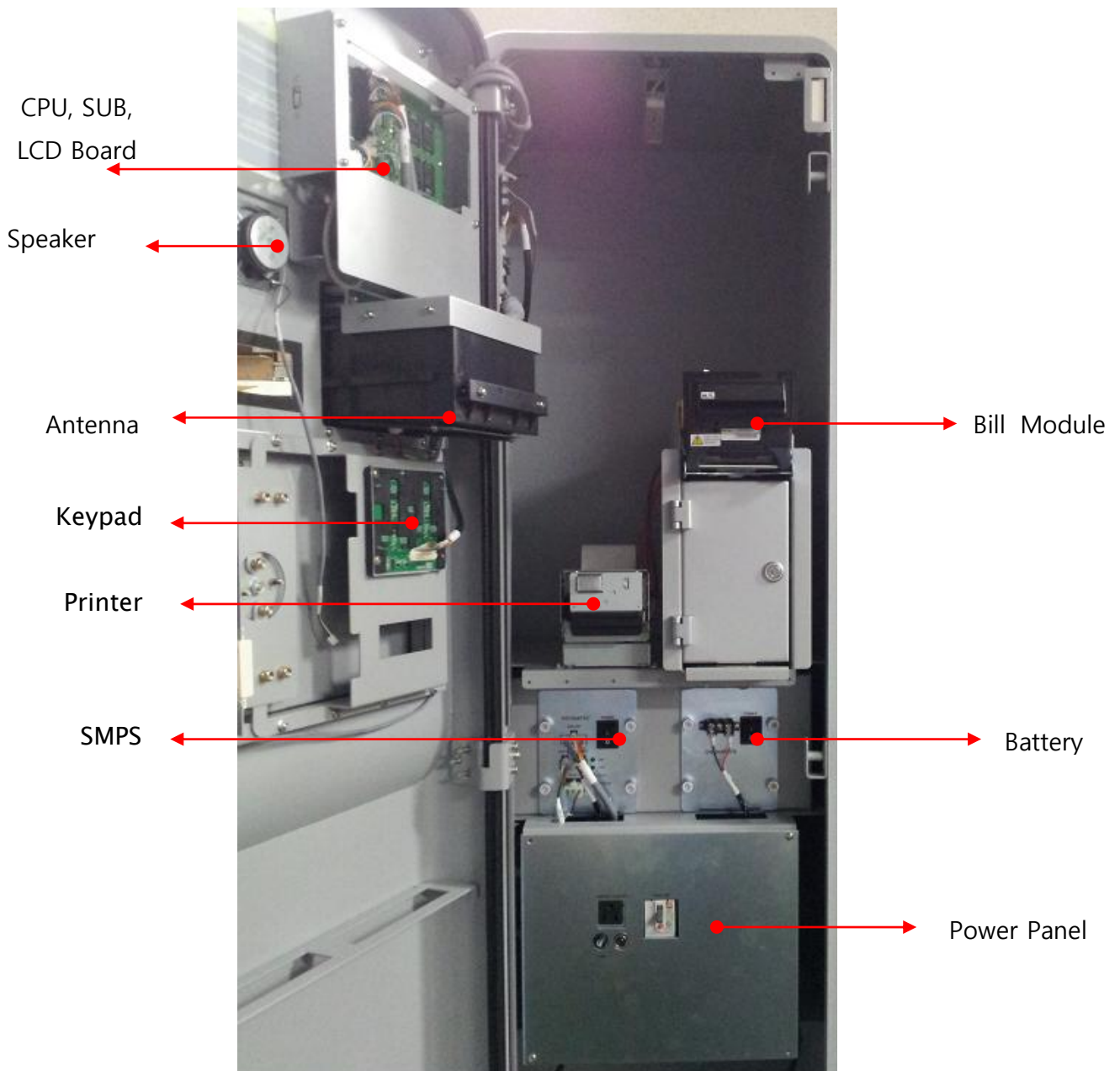


3. Device Maintenance

3.1 Automatic Recharger

3.1.1 Outline

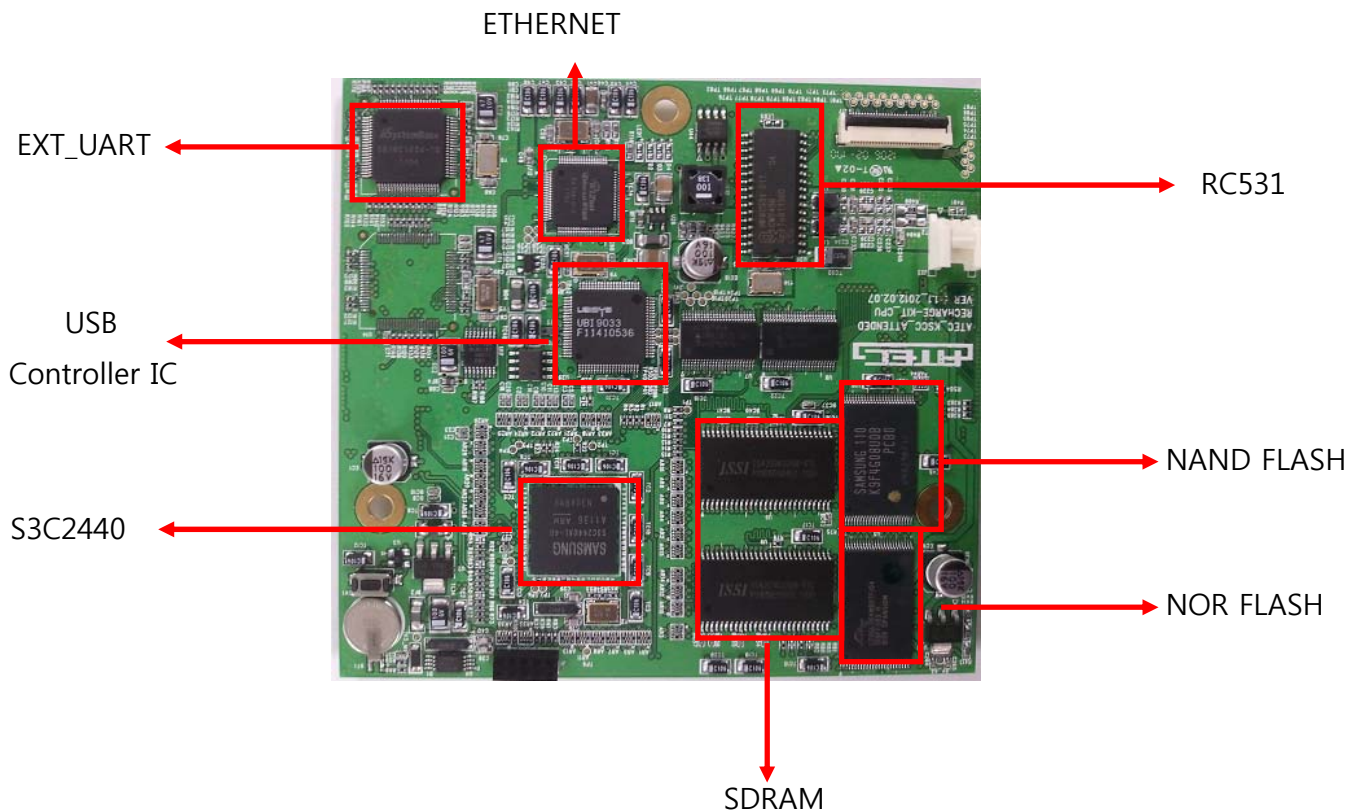
3.1.2 Structure



3.1.3 Specification

1) CPU Specification

CPU Board is the core board and plays main program also control the communication of module.

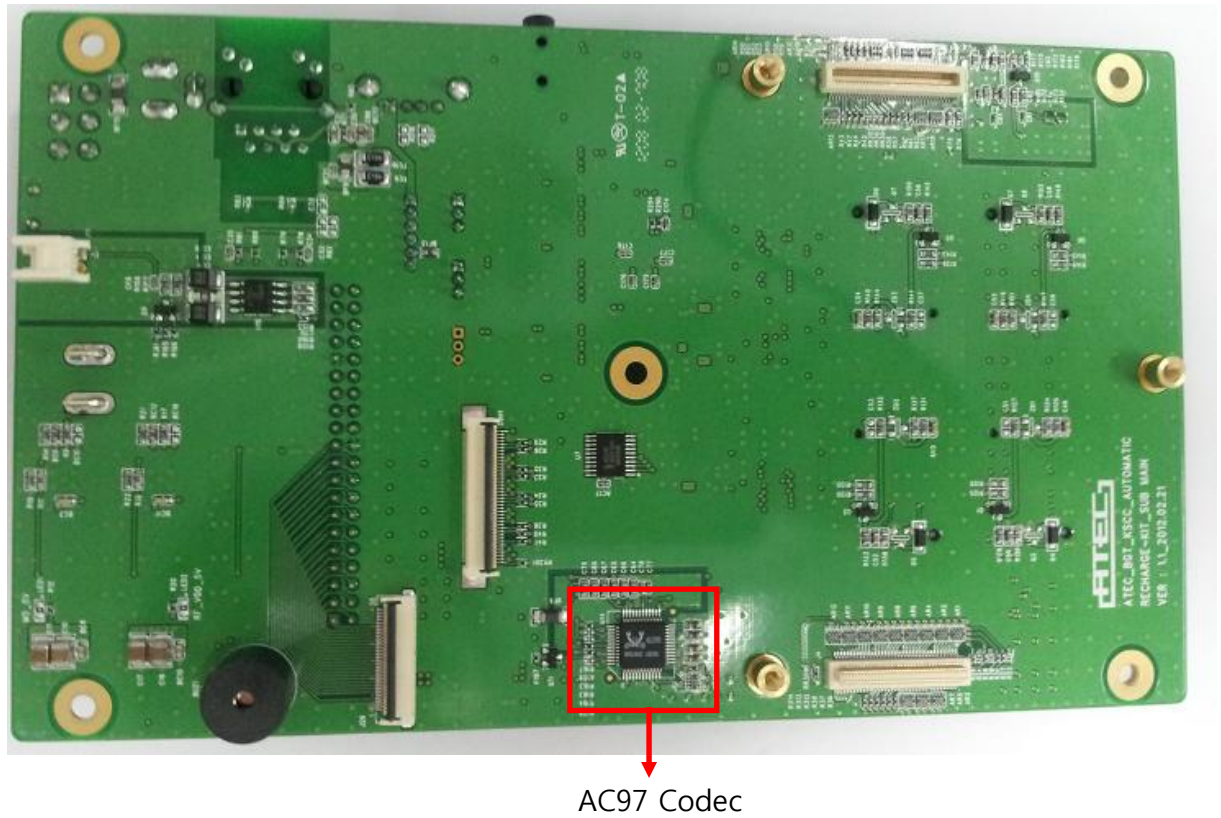


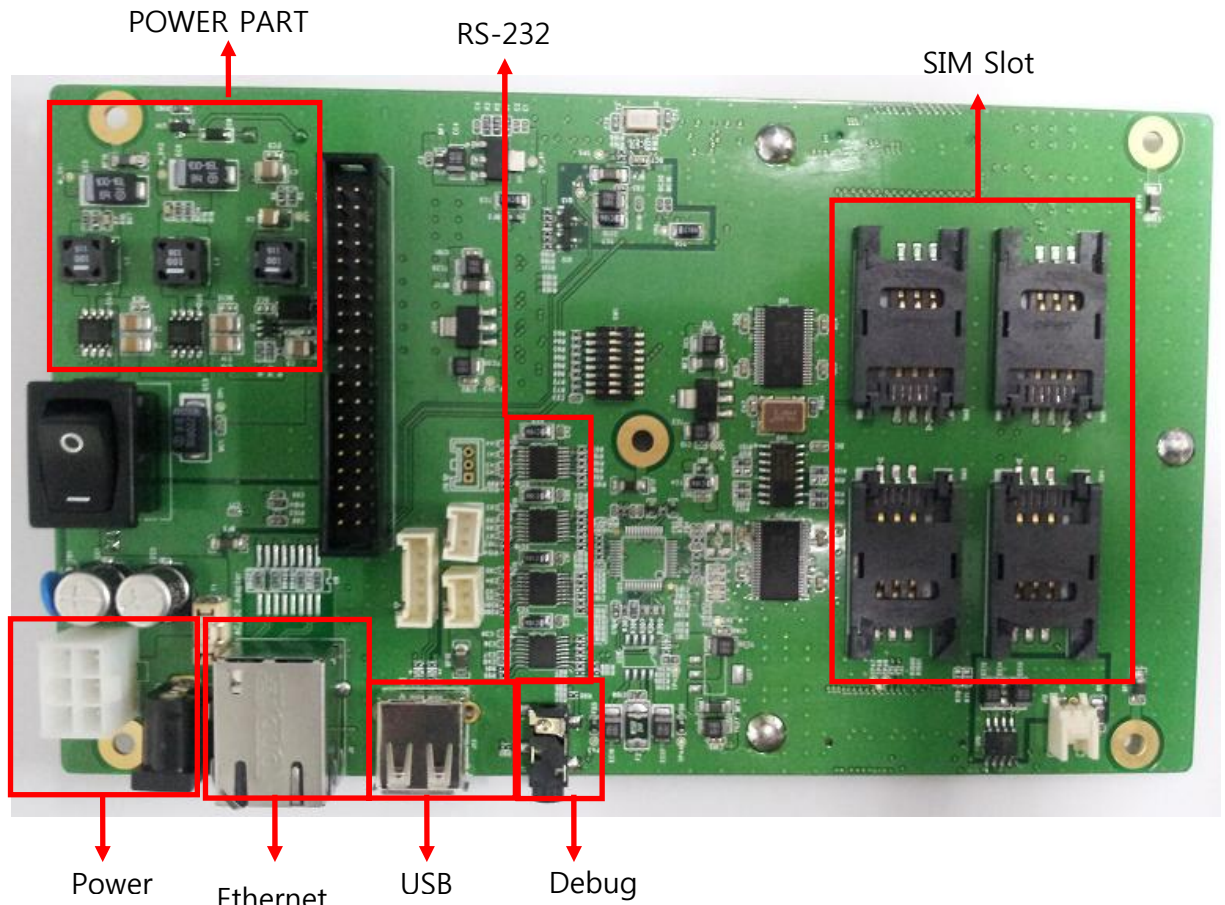
- CPU
 - S3C2440(ARM9 Core) : 400MHz
- Memory
 - SDRAM : 128MByte
 - Nor : 8MByte
 - Nand : 512MByte
- RF Module
 - RC531 (Type A)
- EXT_UART
 - SB16C554A
- USB Controller
 - UBI9033

- ETHERNET
 - W5100 (WIZNET)

2) SUB Main Board Specification

Communicate with CPU Board and control various I/O device.

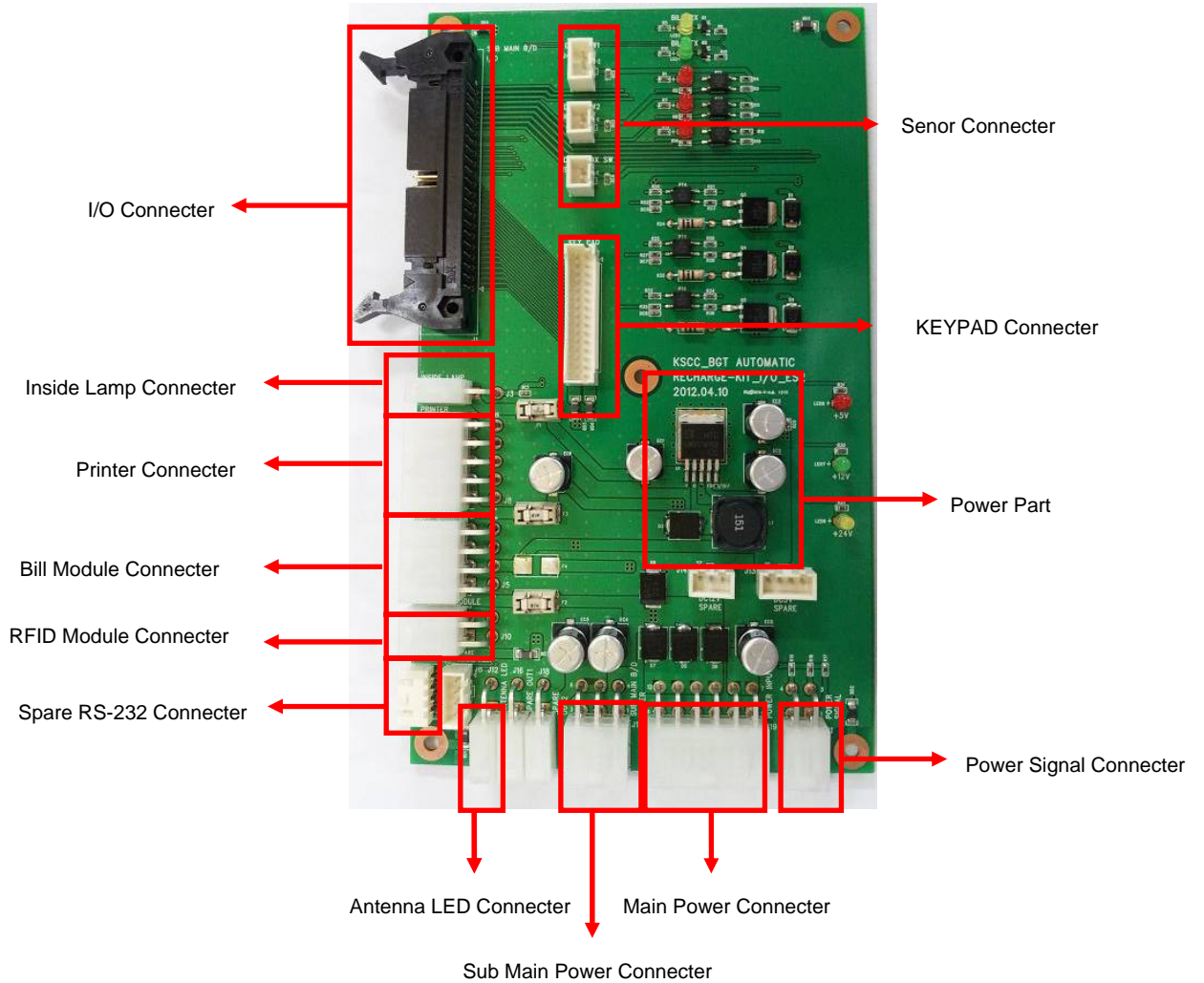




- Exterior PORT
 - Ethernet : 1
 - USB : 1
 - RS -232 : 5
 - : Printer 1, Bill Module1, RFID Reader1, Debug 1, Spare Port 1
- SAM
 - Socket 4EA(SIM Type)
 -
- Sound
 - SW Codec control
 - Speaker : 5W * 1
- Input Power
 - DC12V Input from I/O Board

3) I/O Board Specification

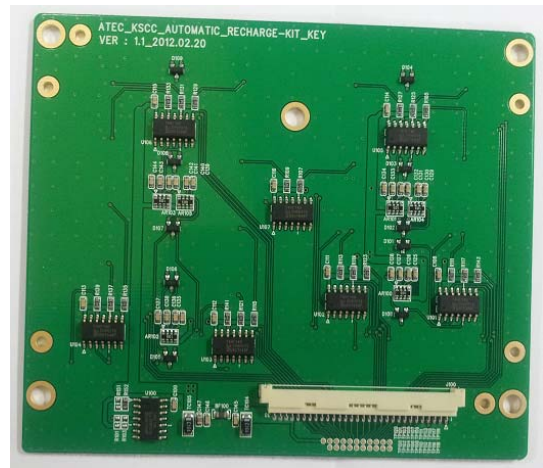
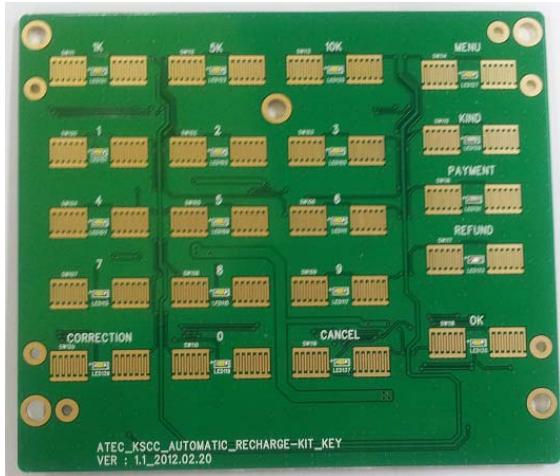
Communicate with CPU Board, Sub main board and control I/O device.



4) Antenna Board Specification

Recognize card connecting CPU Board RC531.

5) Keypad Specification



Transfer entered Key value through I/O Board to CPU Board.

6) SMPS and Battery Specification



- SMPS : Supplied power from Power Panel and output DC 12/24V.
- Battery : 140W(Max) for 2minute.

7) Power Panel Specification



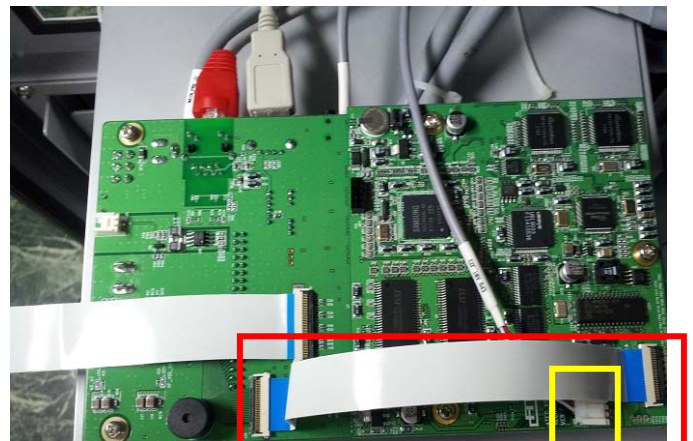
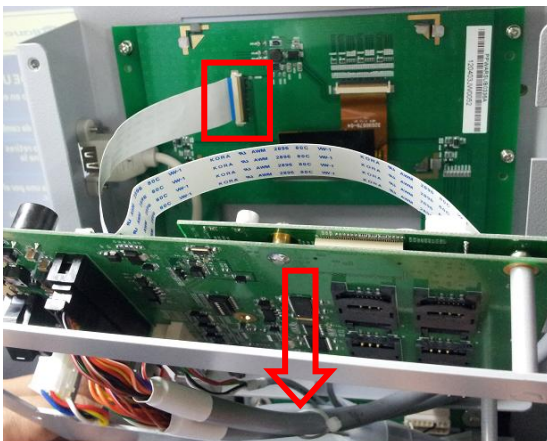
- Supply power from outside power.

3.1.4 Replacement Method

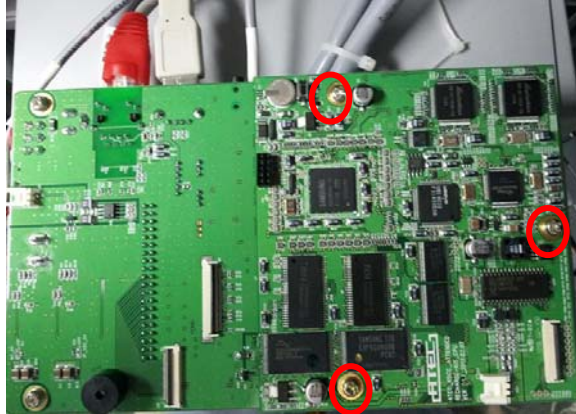
1) CPU Board Separation



- ① Unfasten the screw which is fixed to Sub Main Bracket and let down it.

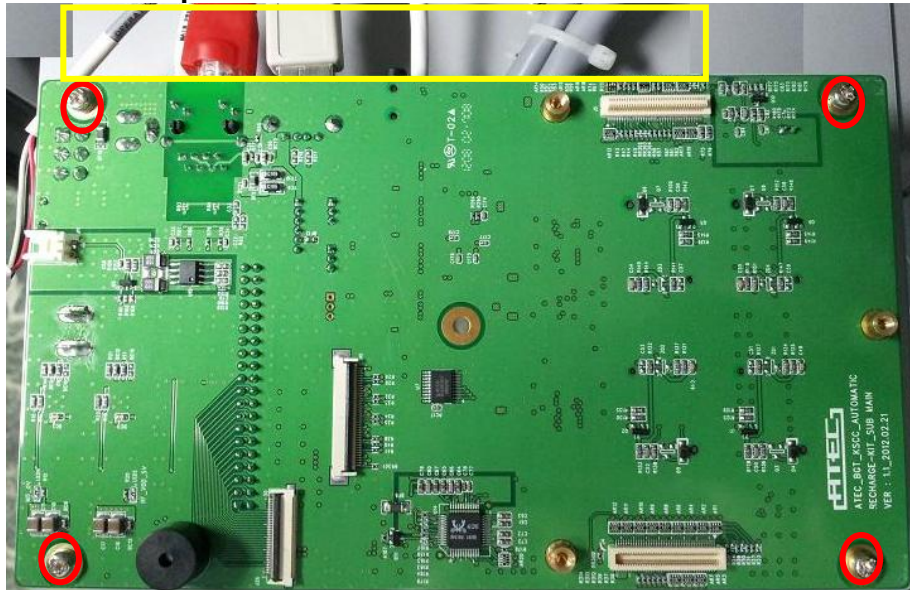


- ② Remove 40Pin FFC cable which is connecting LCD Board and let it down in direction of arrow.
- ③ Remove 30Pin FFC cable and Antenna Cable which is connecting Sub Main Board.



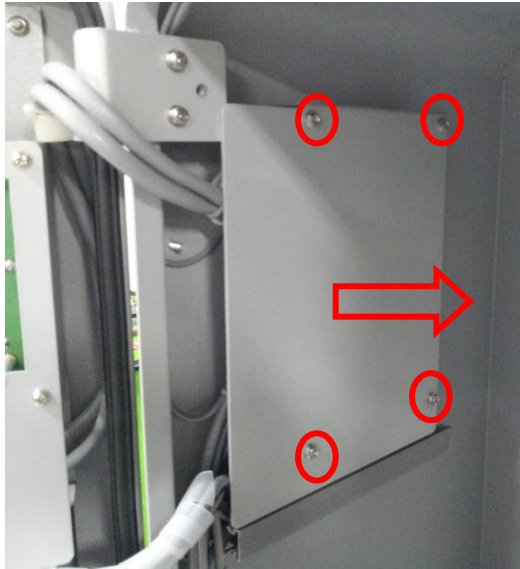
- ④ Unfasten fixed screw which is connecting Sub Main Board and separate Sub Main Board.

2) Sub Main Board Separation

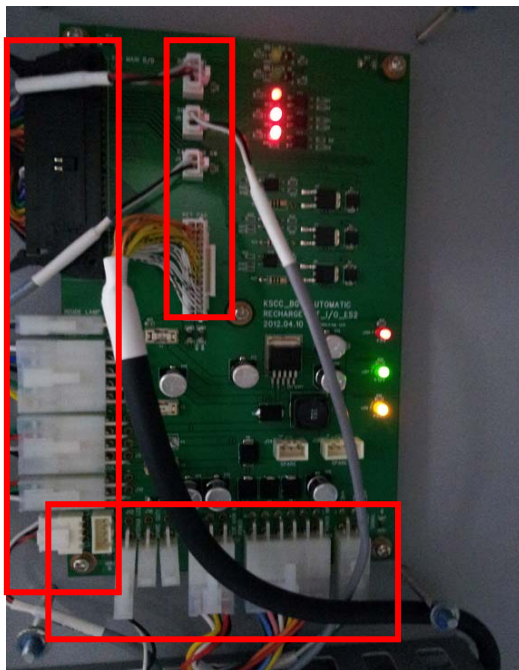


- ① Unfasten fixed screw which is connecting Sub Main Bracket and separate Sub main Board.
- ② Separate Connector which is connecting Sub Main Board.

3) I/O Board Separation

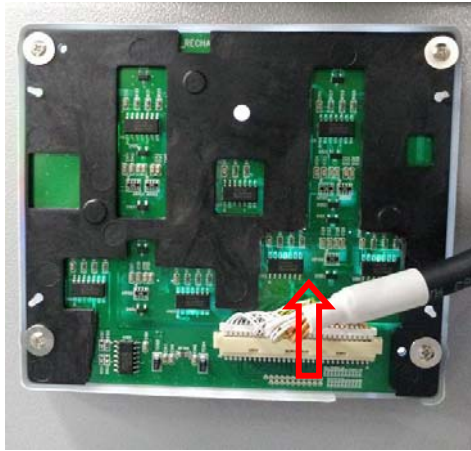


- ① Unfasten fixed screw connecting I/O Cover and separate in direction of arrow.



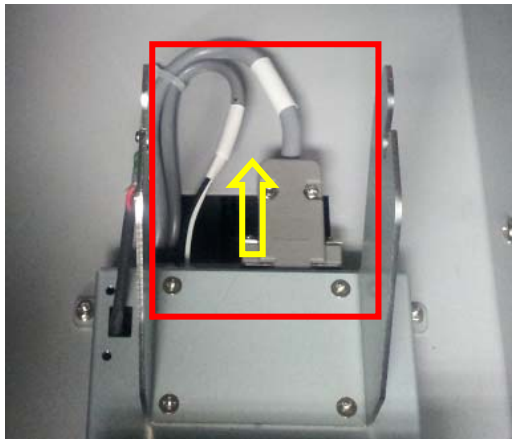
- ② Remove connector connecting I/O Board.
- ③ Unfasten fixed screw which is connecting I/O Board and separate it.

4) KEYPAD Board Separation

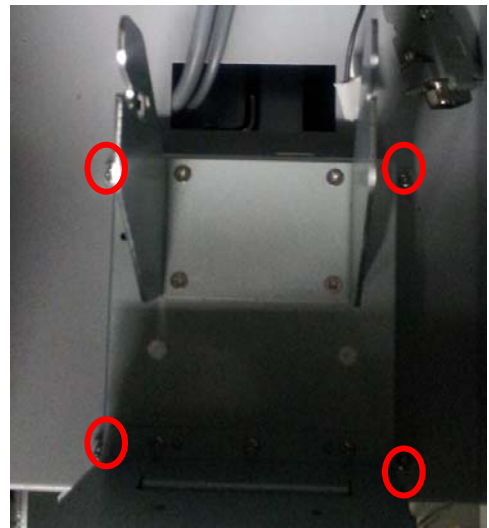


- ① Remove Connector which is connecting.
- ② Separate fixed screw which is connecting KEYPAD and separate KEYPAD.

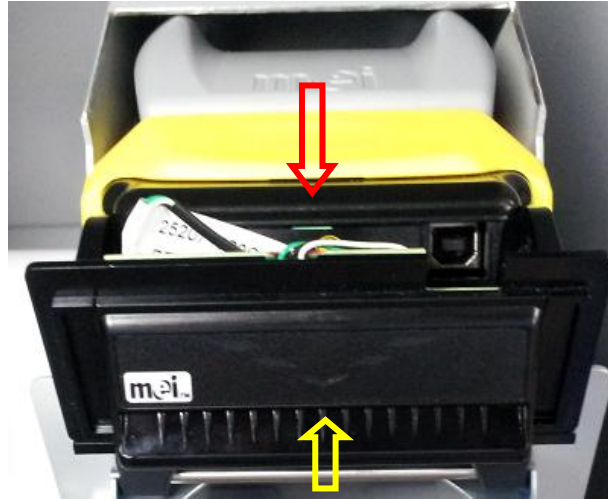
5) PRINTER Separation



- ① Separate Connector which is connecting Printer.
- ② Unfasten fixed screw which is Connected to exterior mechanism and separate it.



6) BILL MODULE Separation



- ① Pull Silver Bar of Bill Module up and separate it in the direction of red arrow.



- ② Hold the bottom of Bill Module PCB and pull forward.

7) SMPS 및 BATTERY Separation



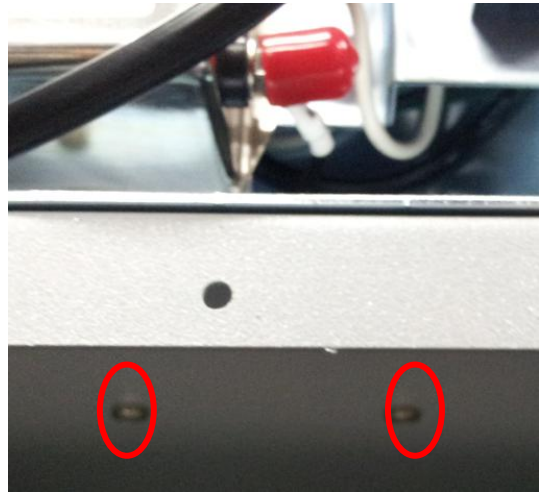
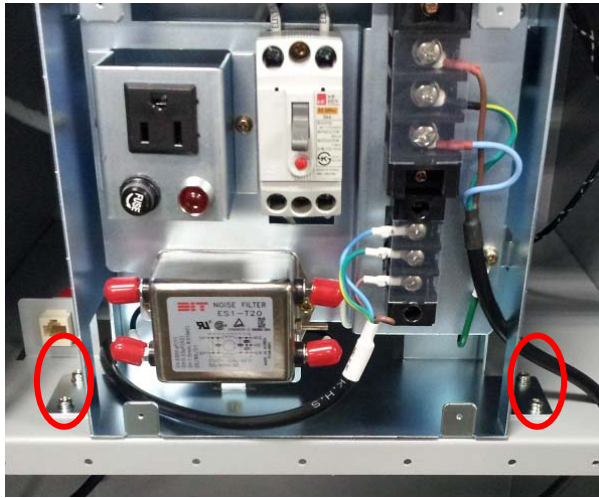
① Separate Connector which is connecting SMPS and Battery.



② Unfasten fixed screw which is connecting to exterior and pull forward.



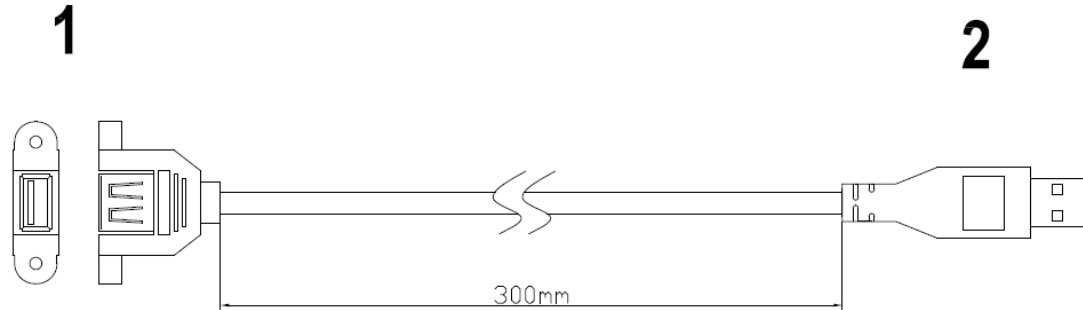
8) POWER PANEL Separation



Separate the fixed screw which is connected device.

3.1.5 Connector Specification

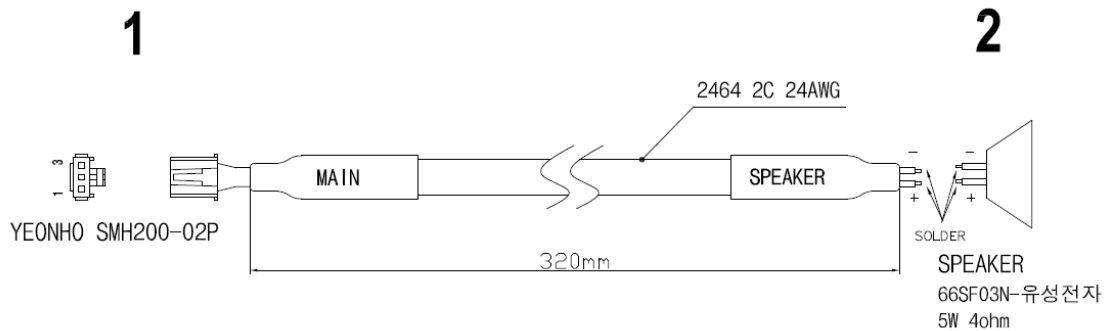
1) USB2.0 Cable



PANLE 취부 TYPE
USB 2.0 CABLE

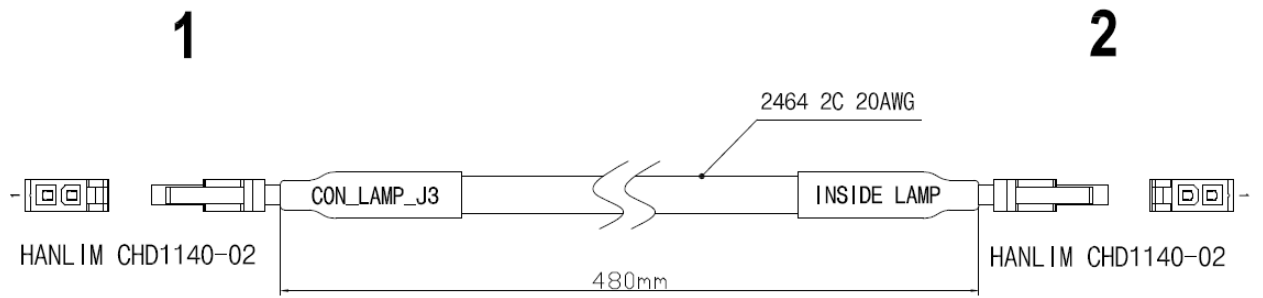
CON '1' (USB2.0)	Color	CON '2' (Sub Board J13)
1		1
2		2
3		3
4		4

2) Speaker Cable



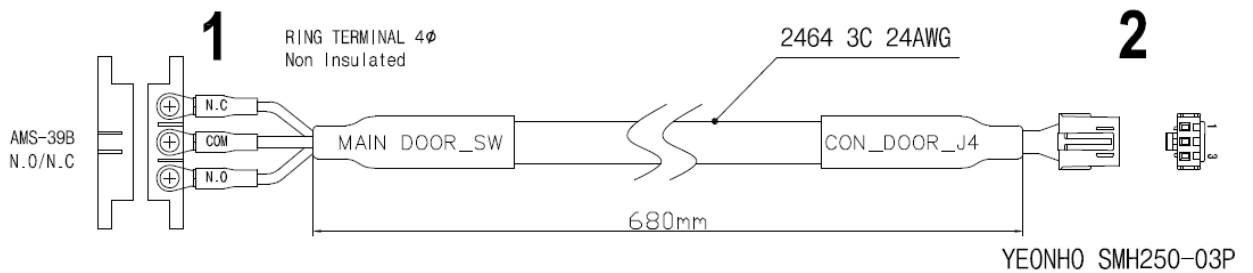
CON '1' '(Sub Board J11,J12)	Color	CON '2' (66SF03N- 5W 4ohm)
1	WHITE	1
2	BLACK	2

3) Inside Lamp Cable



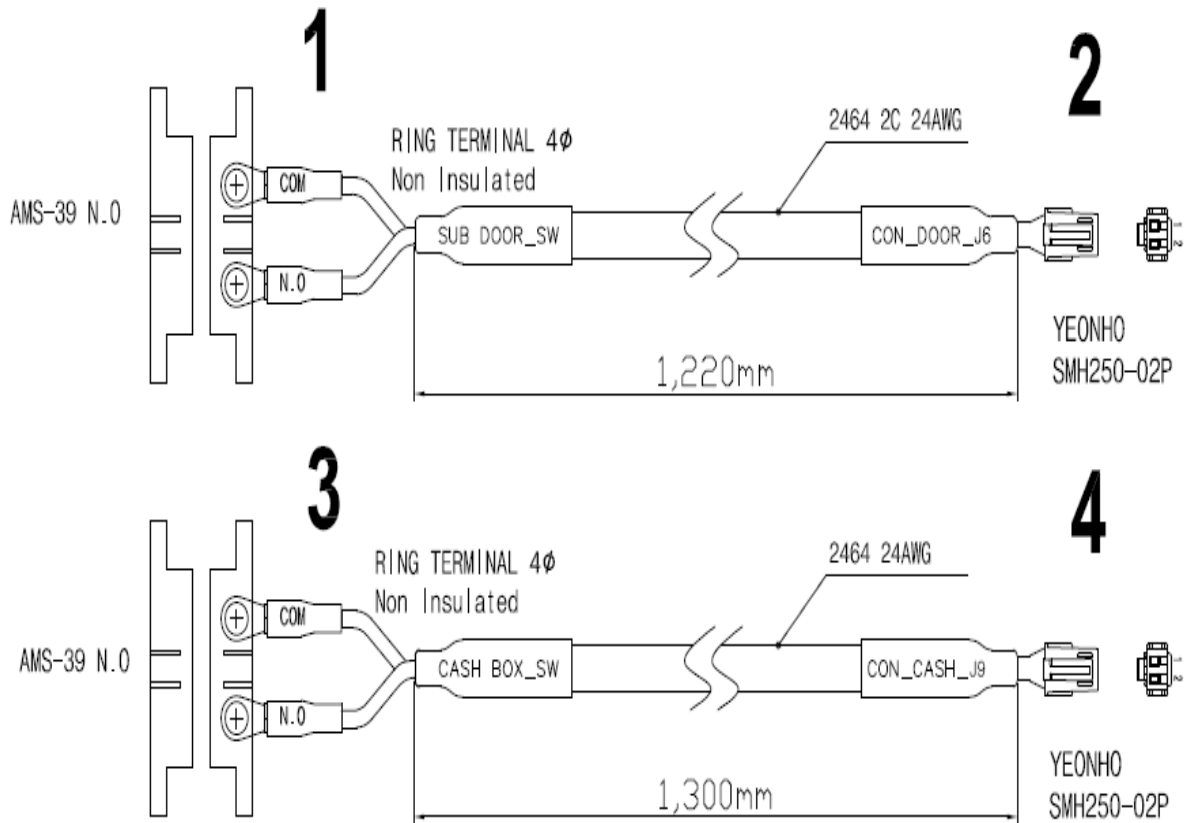
CON '1' (Connector Board J3)	Color	CON '2' (INSIDE LAMP)
1	12V	2
2	GND	1

4) Main Door_SW Cable



CON '1' (Main Door_SW)	Color	CON '2' (Connector Board J4)
1	BLACK	3
2	RED	2
3	WHITE	1

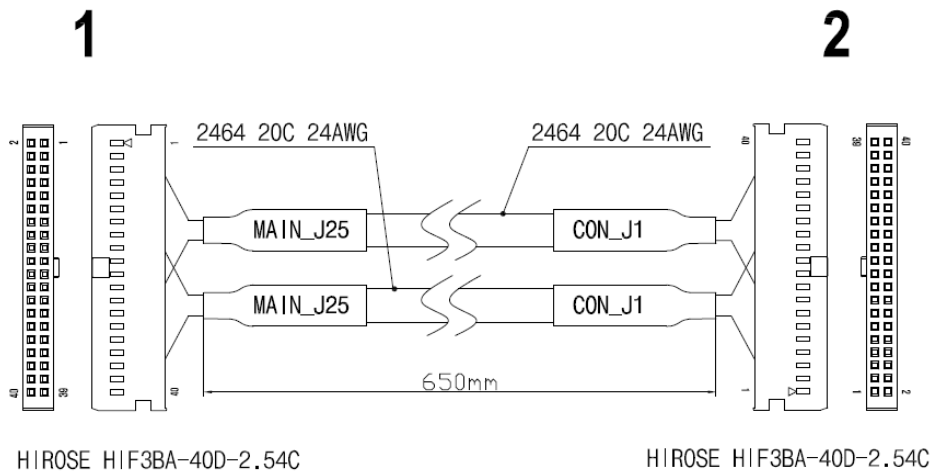
5) SUB DOOR, CASH BOX S/W Cable



CON '1' (SUB Door_SW)	Color	CON '2' (Connector Board_J6)
COM	BLACK	2
N. O	WHITE	1

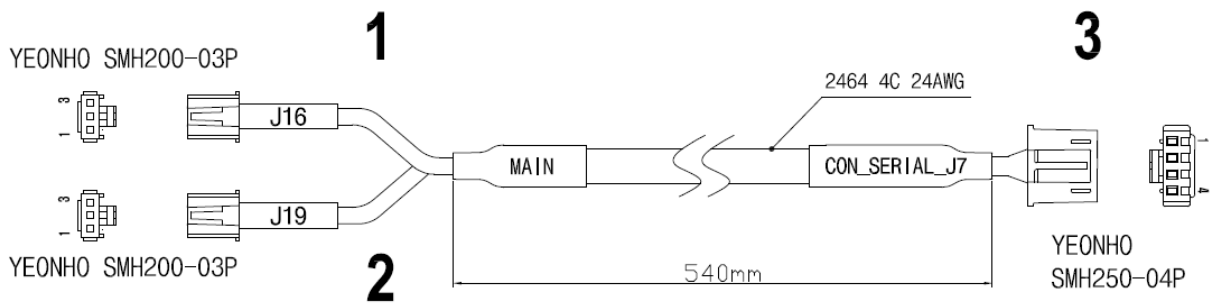
CON '3' (CASH BOX_SW)	Color	CON '4' (Connector Board_J9)
COM	BLACK	2
N. O	WHITE	1

6) MAIN IF Cable



CON '1' (SUB Board_J25)	Color	CON '2' (Connector Board_J1)
1		1
2		2
....	
39		39
40		40

7) Main Serial Cable

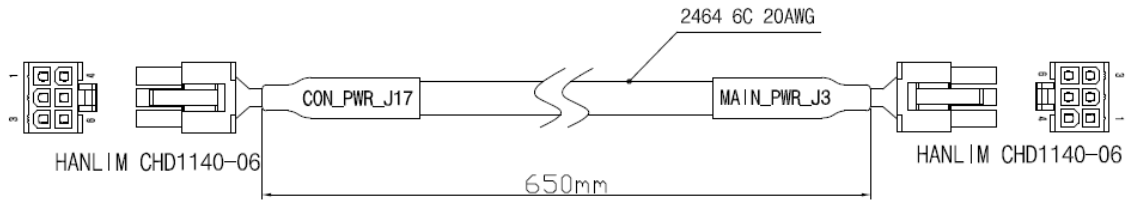


CON '1' (SUB Board_J16)	Color	CON '3' (Connector Board_J7)
1		1
2		2
CON '2' (SUB Board_J16)	Color	CON '3' (Connector Board_J7)
1		3
2		4

8) Main Power Cable

1

2

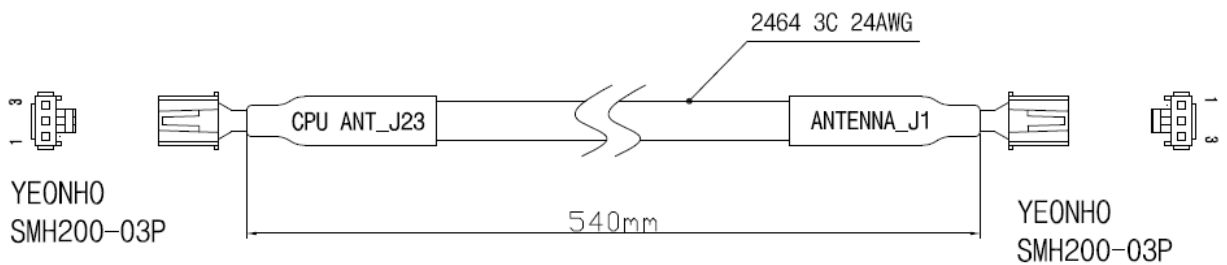


CON '1' (Connector Board_J17)	Color	CON '2' (Sub Board_J3)
1		1
2		2
3		3
4		4
5		5
6		6

9) Antenna Cable

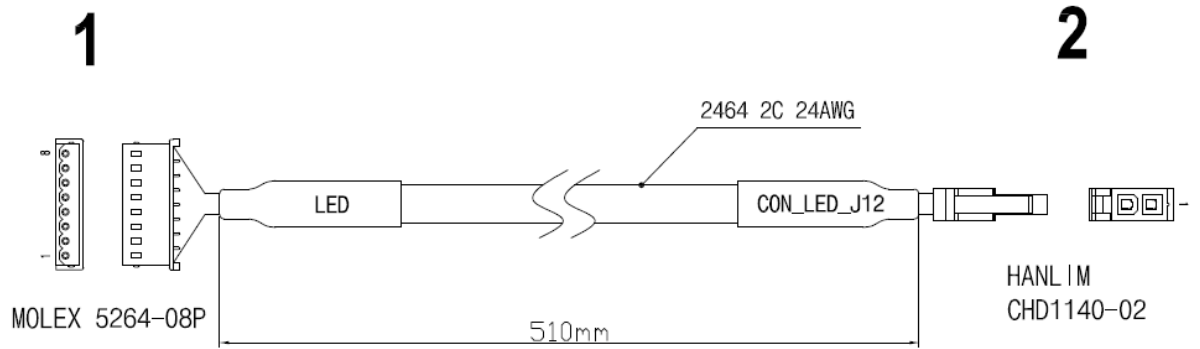
1

2



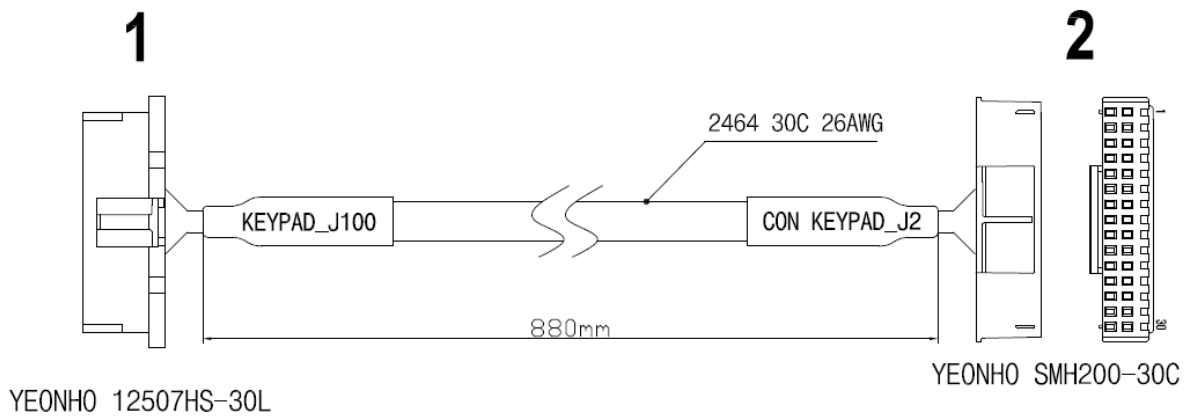
CON '1' (CPU Board_J23)	Color	CON '2' (Antenna Board_J1)
1	RED	1
2	WHITE	2
3	BLACK	3

10) Antenna LED Cable



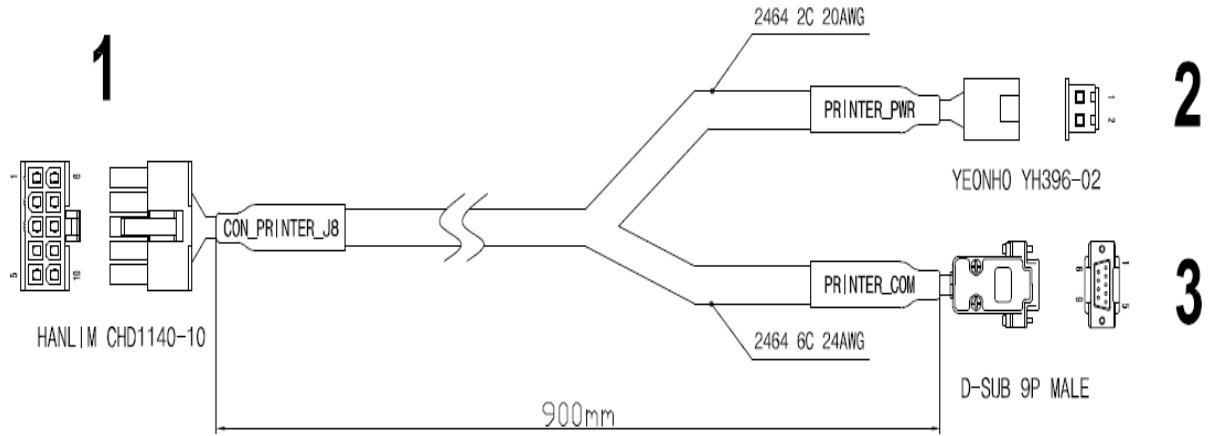
CON '1' (LED Board)	Color	CON '2' (Connector Board_J12)
1	WHITE	1
6	BLACK	2

11) KEYPAD Cable



CON '1' (KEYPAD Board)	Color	CON '2' (Connector Board_J2)
1		1
2		2
...		...
29		29
30		30

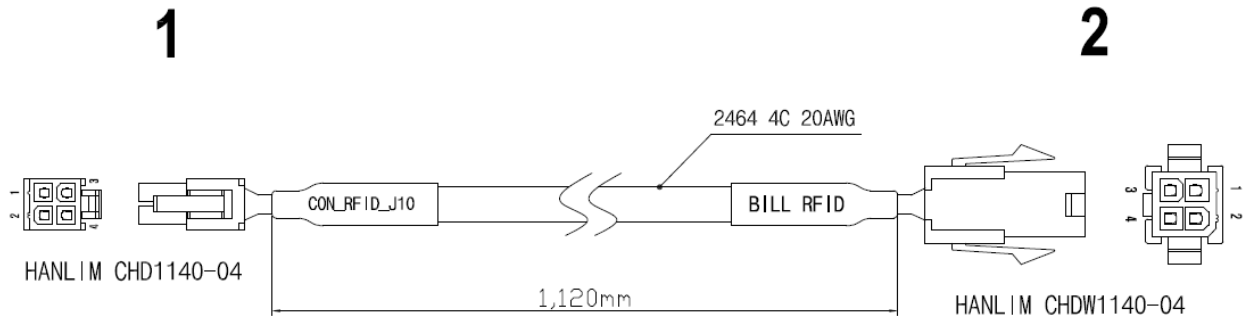
12) Printer Cable



CON '1' (Connector Board J8)	Color	CON '2' (PRINTER_PWR)
1	RED	1
3	BLACK	2

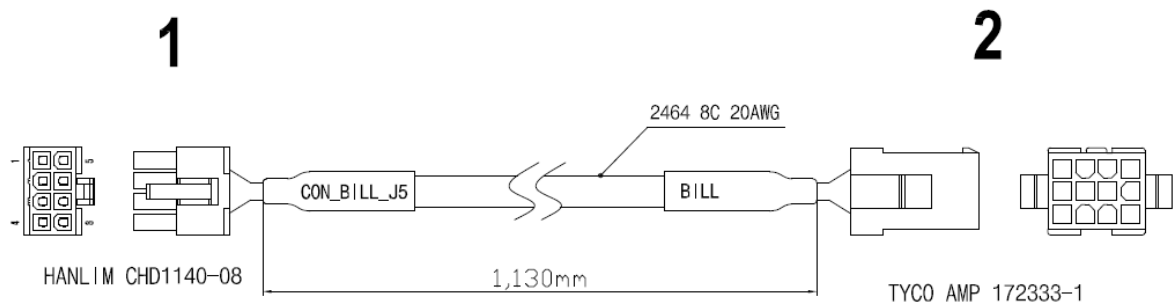
CON '1' (Connector Board J8)	Color	CON '2' (PRINTER_PWR)
4	BLACK	5
5	ORANGE	2
6	YELLOW	3
7	GREEN	6
9	BLUE	8
10	PINK	7

13) BILL RFID READER Cable



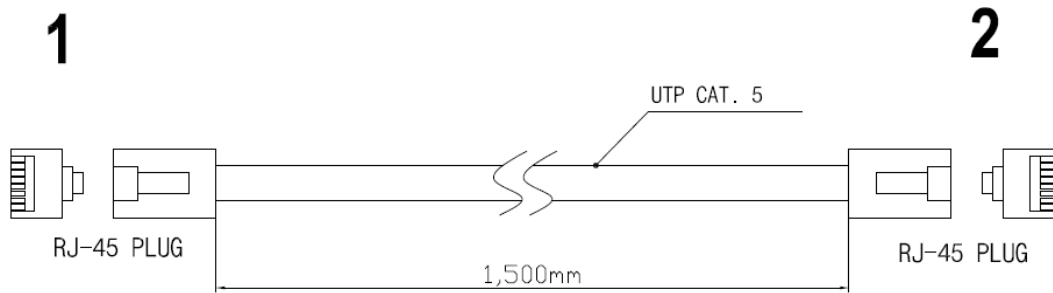
CON '1' (Connector Board J10)	Color	CON '2' (BILL RFID)
1	RED	1
2	BLACK	2
3	BLUE	3
4	WHITE	4

14) BILL Module Cable



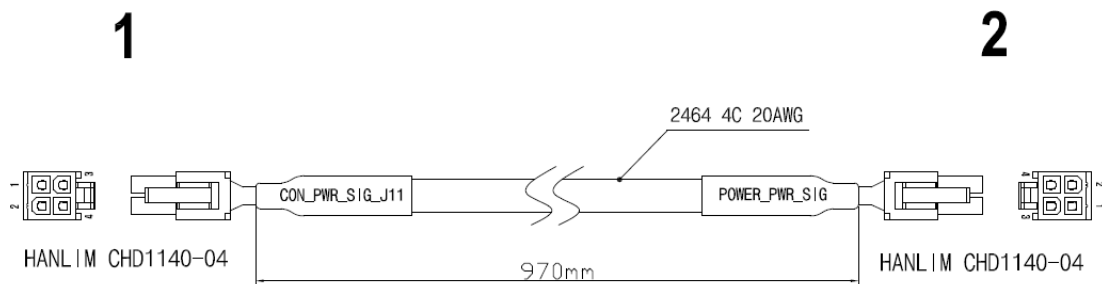
CON '1' (Connector Board J5)	Color	CON '2' (BILL Module)
1	BLACK	5
2	WHITE	11
3	BLACK	7
7	RED	6
8	GREEN	12

15) LAN Cable



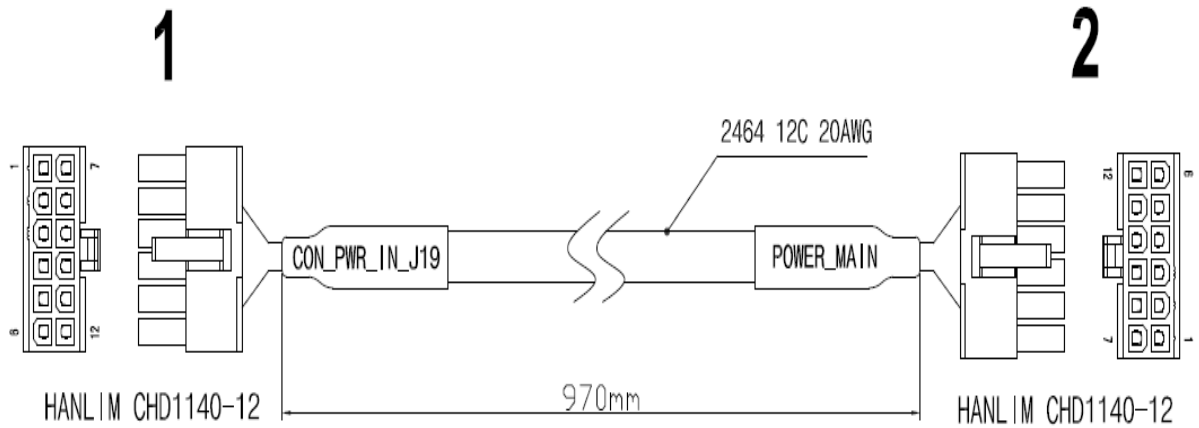
CON '1' (RJ-45)	Color	CON '2' (RJ-45)
1		1
2		2
3		3
4		4
5		5
6		6
7		7
8		8

16) Power Signal Cable



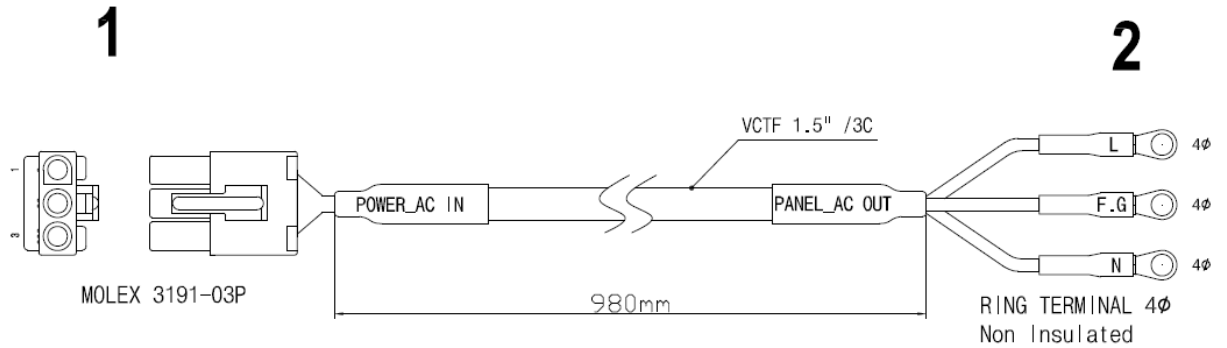
CON '1' (Connector Board J11)	Color	CON '2' (SMPS SIGNAL)
1	RED	1
2	BLACK	2
3	BLUE	3
4	WHITE	4

17) Power Input Cable



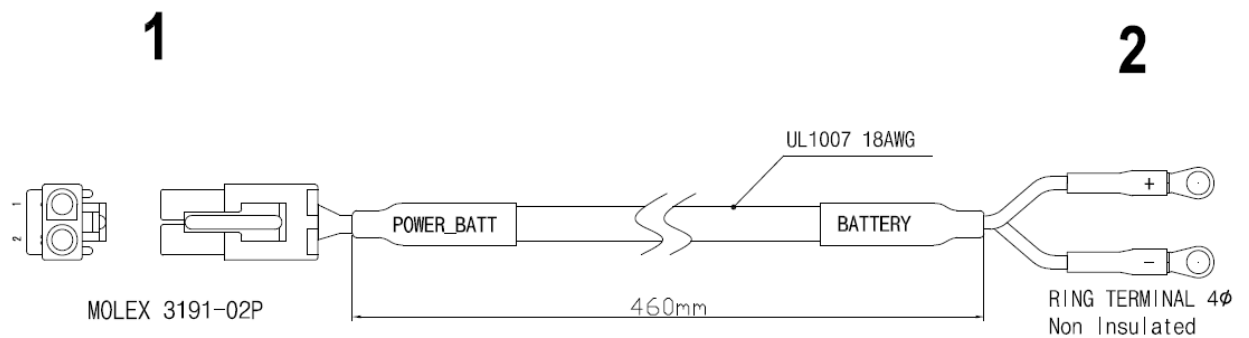
CON '1' (Connector Board J19)	Color	CON '2' (Sub Main)
1	BLACK	1
2	BLACK	2
3	BLACK	3
4	BLACK	4
5	BLACK	5
6	BLACK	6
7	RED	7
8	RED	8
9	WHITE	9
10	WHITE	10
11	WHITE	11
12	WHITE	12

18) AC Input Cable



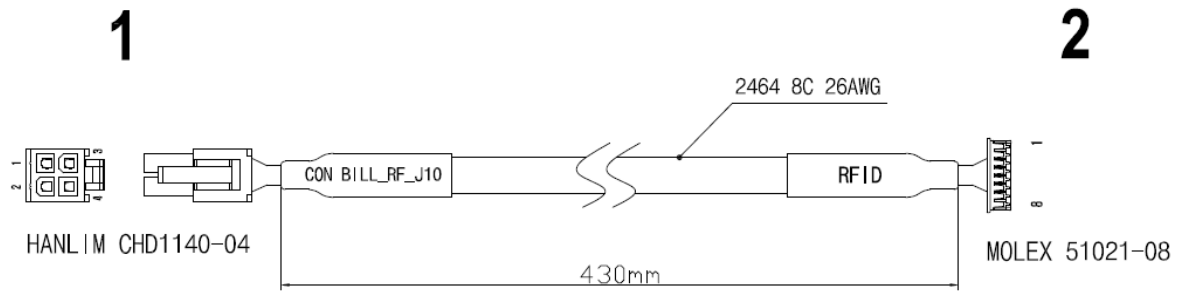
CON '1' (SMPS AC IN)	Color	CON '2' (POWER_AC OUT)
1	BROWN	L
2	Greenish yellow	F. G
3	BLUE	AC_N

19) Battery Cable



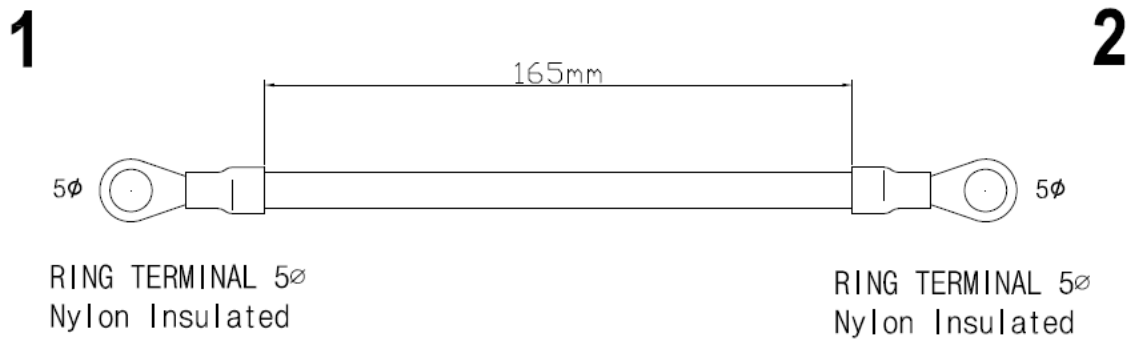
CON '1' (SMPS BATT_OUT)	Color	CON '2' (BATTERY)
1	RED	VCC
2	BLACK	GND

20) RFID Cable

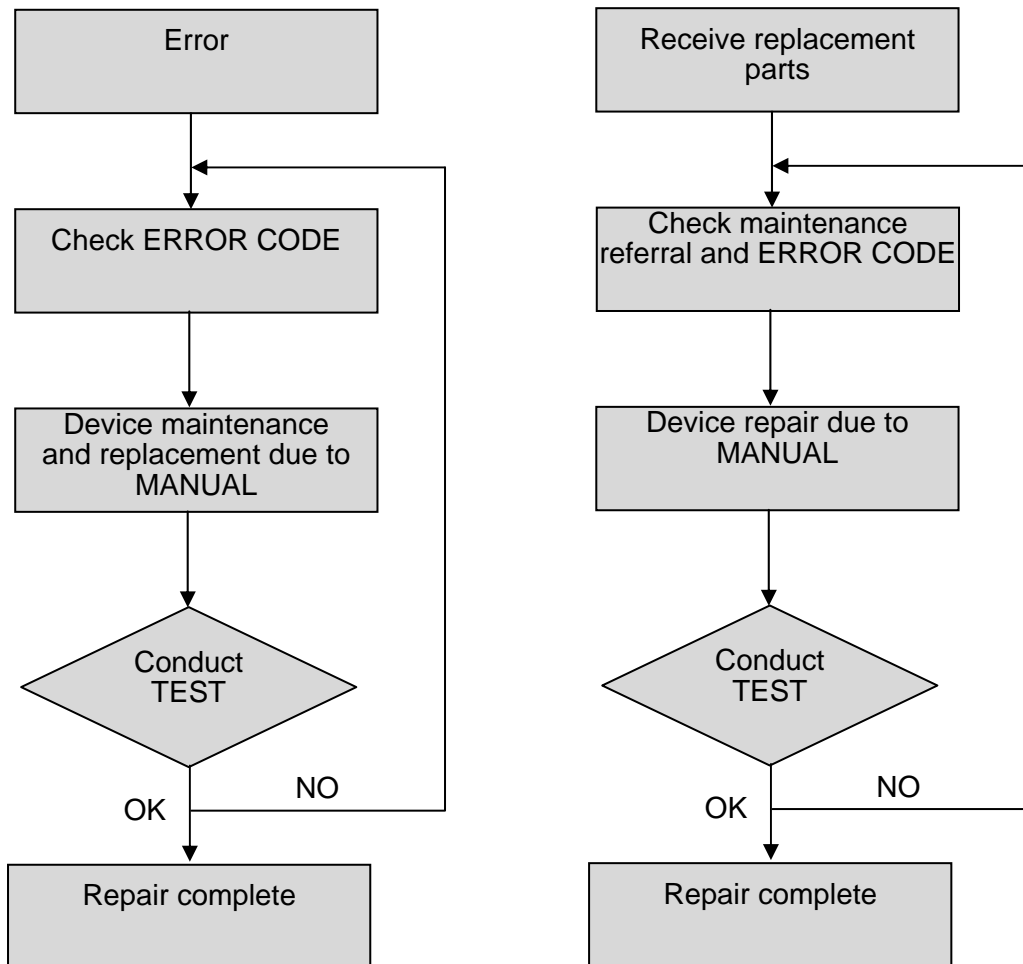


CON '1' (SMPS BATT_OUT)	Color	CON '2' (BATTERY)
1	Red	1
	Red	2
2	BLACK	7
	BLACK	8
3	BLUE	3
	BLUE	4
4	WHITE	5
	WHITE	6

21) FREME Ground



3.2 Maintenance Flow chart



1) Tool : Screwdriver, Tester

2) Notice

- Check each part of the adjustment value for every 12months or in a timely manner.

3) Detail check items

No	Items	Inspection cycle				Remarks
		1 month	3months	6months	12months	
1	Power/Voltage Check					
2	Operation of Printer					
3	Operation of KEYPAD					
4	Check of LCD Operation					
5	Check of SMPS Operation					
6	Check of BATTERY Operation					
7	Check of BILL MODULE Operation					
8	Check of POWER panel Operation					

4. Automatic Recharger Installation and update

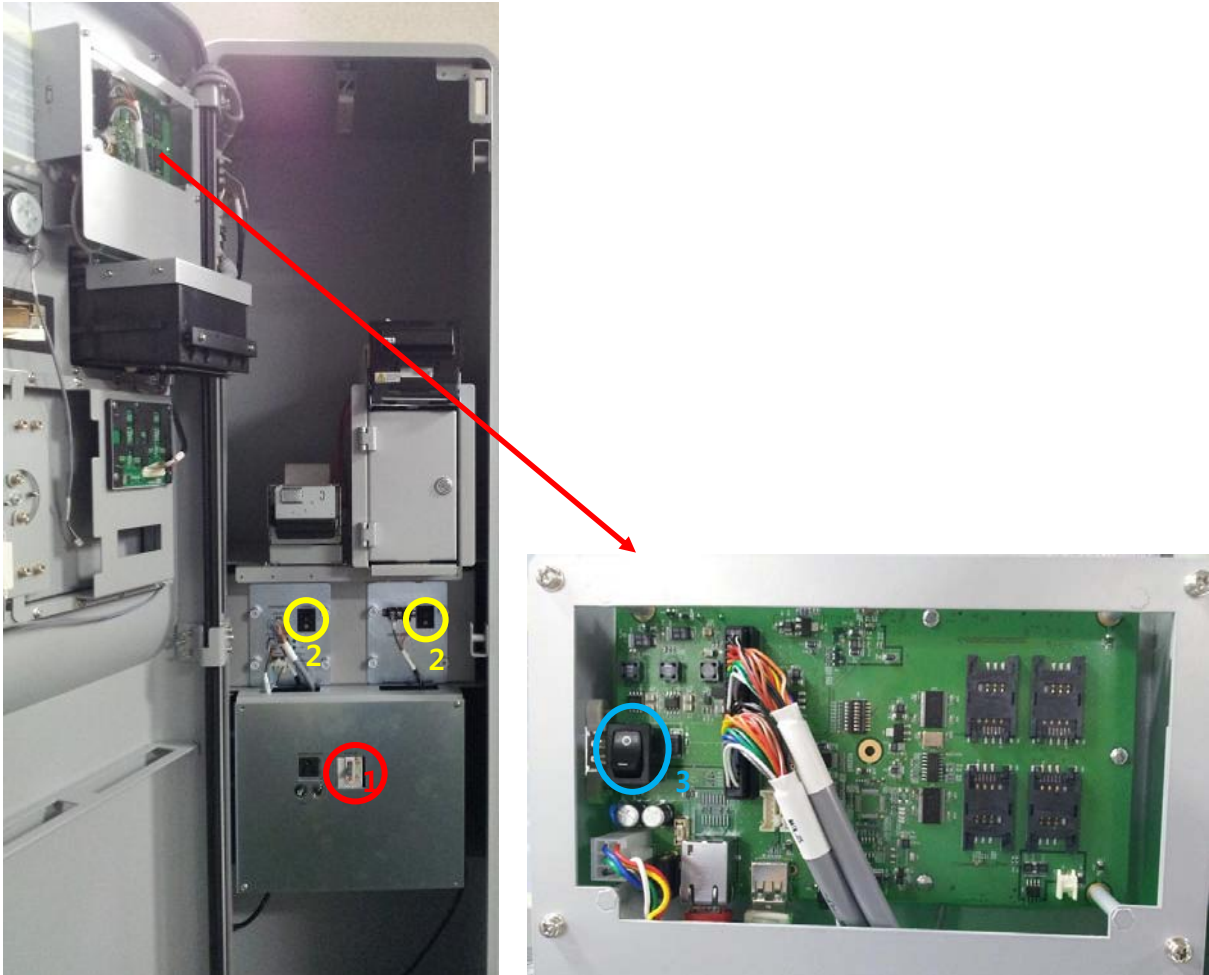
4.1 Automatic Recharger Installation

4.1.1 Procedure

No	Division	Contents	비고
1	Device registration	1) Power ON 2) SAM Mounting Method 3) USB Mounting Method	
...

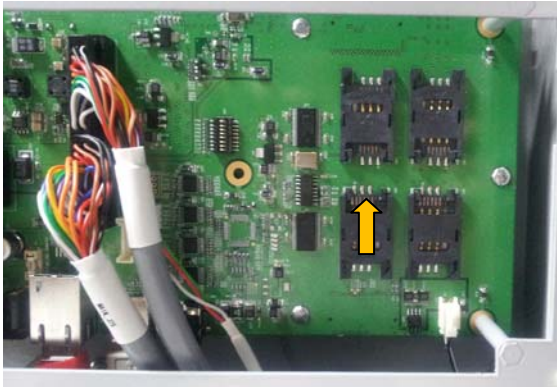
4.1.2 Device Registration

4.1.2.1 Power ON



- ① Power Panel Power S/W ON
- ② SMPS Power S/W ON, Battery S/W ON
- ③ Sub Main Board S/W ON

4.1.2.2 SAM Card Mounting



<Picture 1>



<Picture 2>

- ① Push the SAM slot like Picture 1 and lift the cover in direction of the arrow like picture

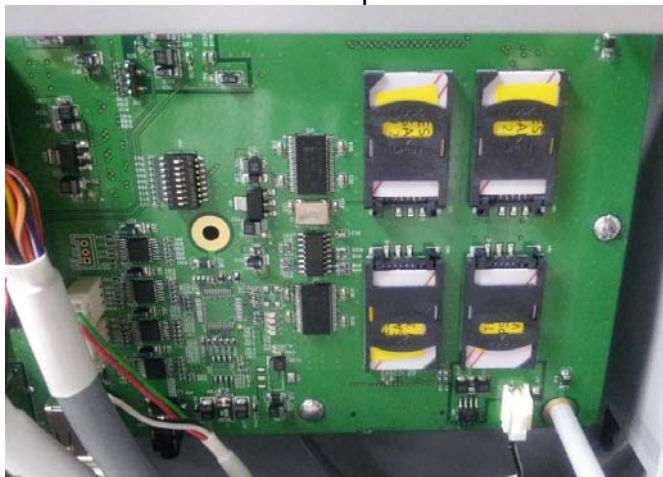


<Picture 3>



<Picture 4>

- ② Combine the SAM card like picture 3 and push and fix SAM Slot in direction of the arrow like picture 4.



- ③ Insert the rest of 3 slots using same method.

4.1.2.3 USB Mounting Method



- ① Turn off the module
- ② Insert USB to USB PORT and power on

5. Automatic Recharger Heavy Maintenance

5.1 CPU Board

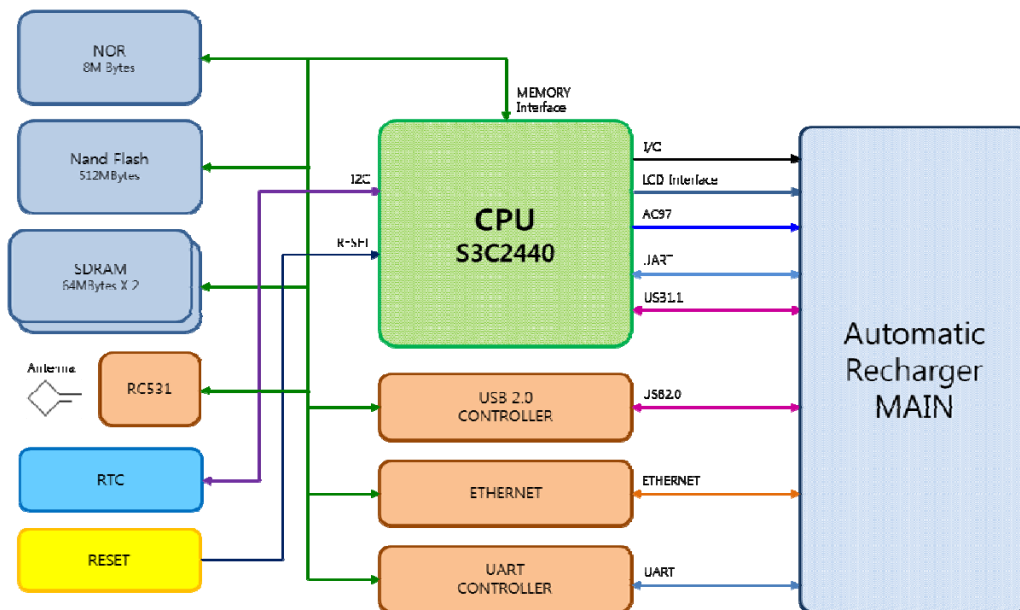
5.1.1 CPU BOARD Specification

5.1.1.1 CPU Board Specification

CPU Board : Main board of the attended recharger and operate main program so that control all of module communication and function.

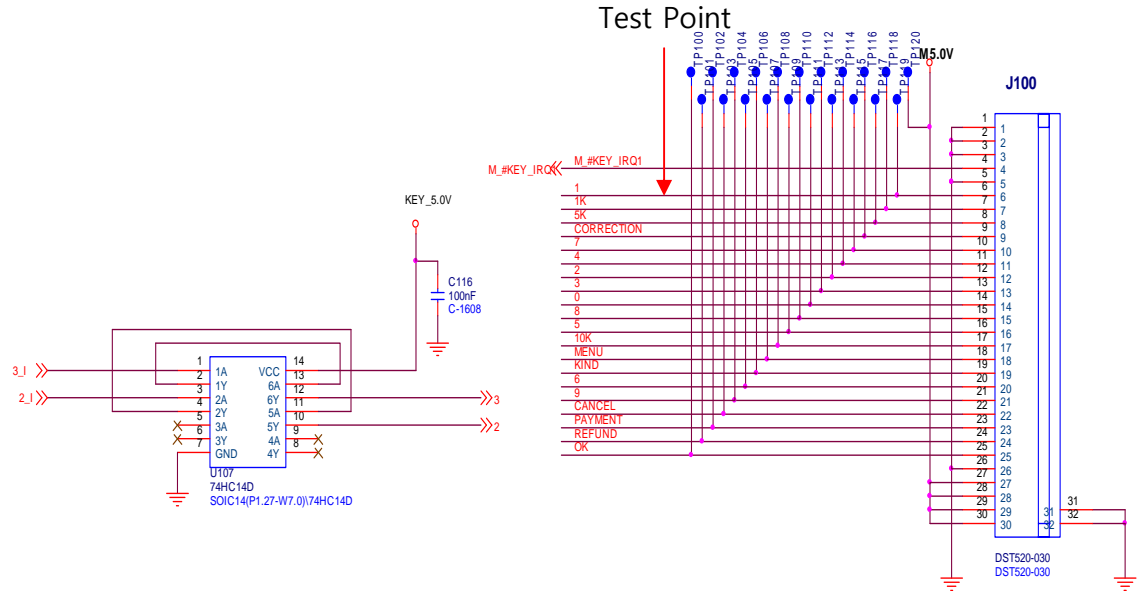
Division	Specification	Remarks
CPU	S3C24440	
Memory	SDRAM : 128MByte Nor Flash : 8MByte Nand Flash : 512 MByte	
RF Module	ISO 14443 Type A	

5.1.1.2 CPU Board Block Diagram

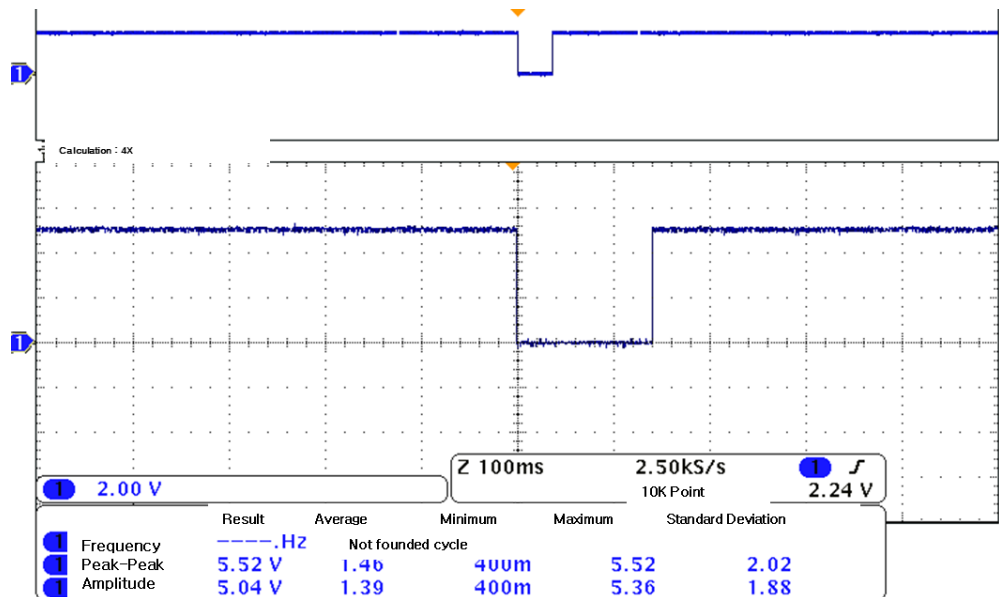


5.1.1.3 CPU Board Check point

- KEYPAD



- ① Circuit description
: Invert input signal and send it to CPU.
(Check other signal's frame is same as others or not.)
- ② Waveform measurements



<Normal key input waveform>

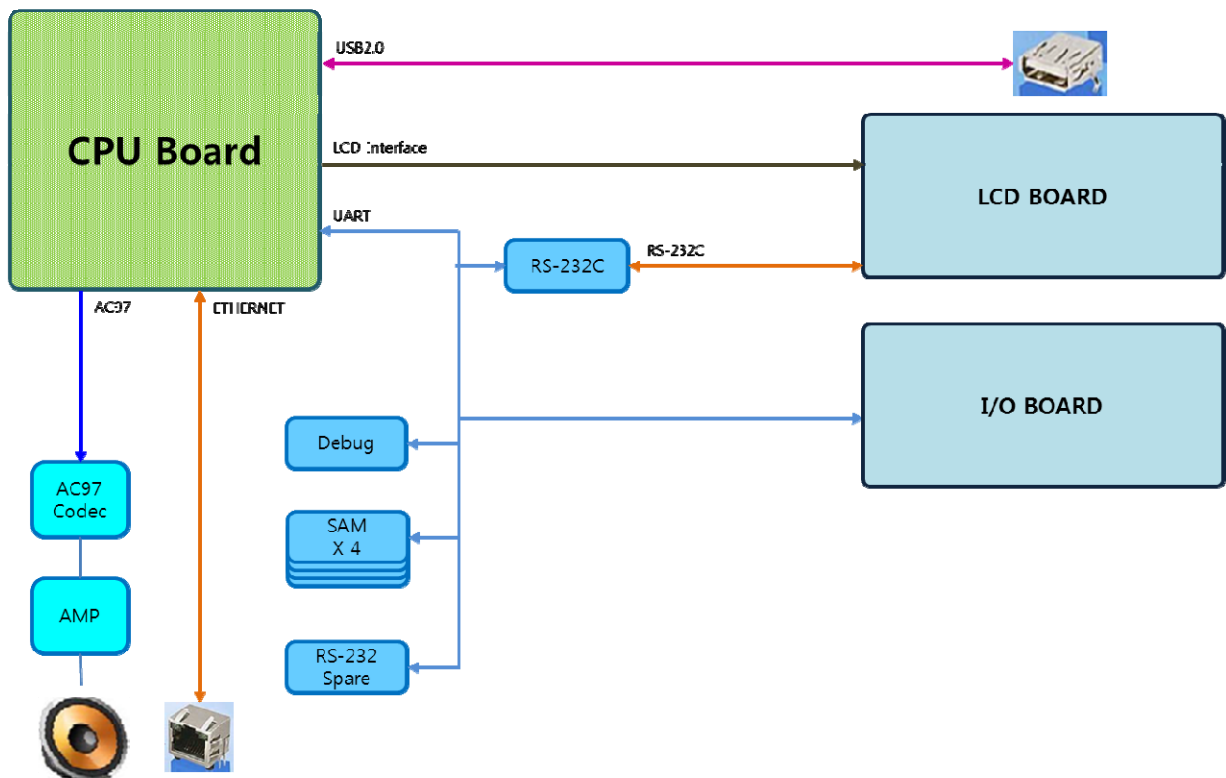
5.1.2 Sub BOARD Specification

5.1.2.1 Sub Main Board Specification

- Communicated with CPU Board and control I/O.

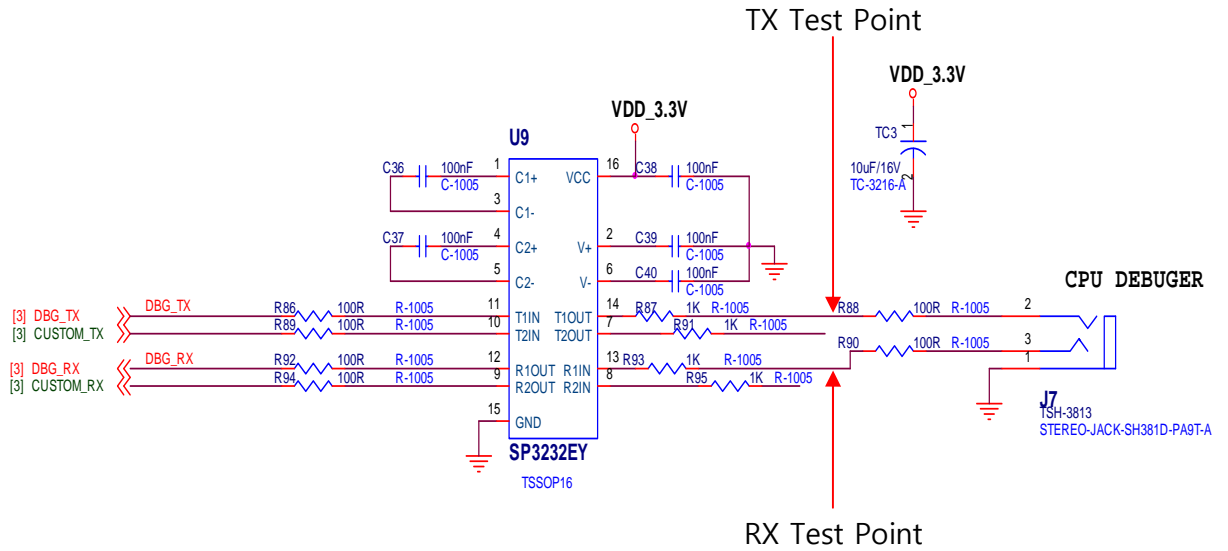
Article	Specification	Remarks
CPU	S3C24440	
Memory	SDRAM : 128MByte Nor Flash : 8MByte Nand Flash : 512 MByte	
RF Module	ISO 14443 Type A	

5.1.2.2 Sub Main Board Block Diagram



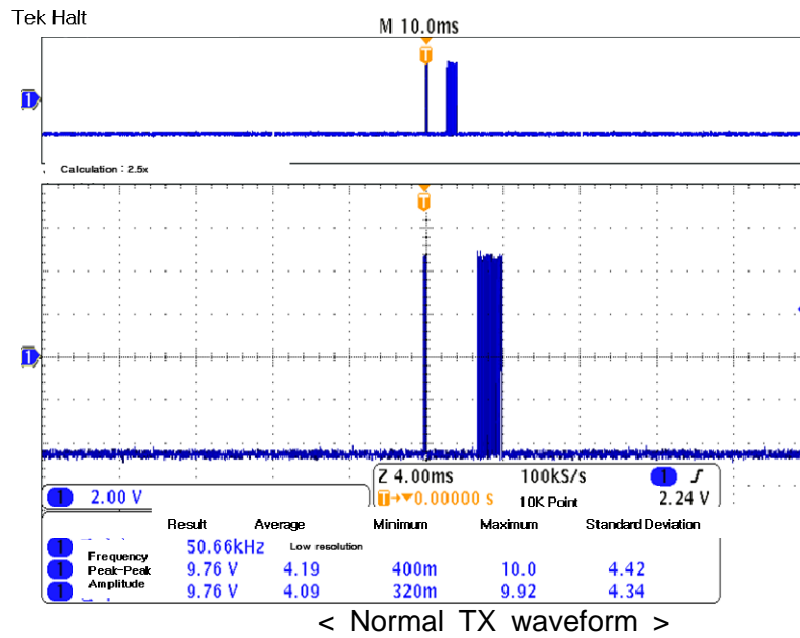
5.1.2.3 Sub Main Check point

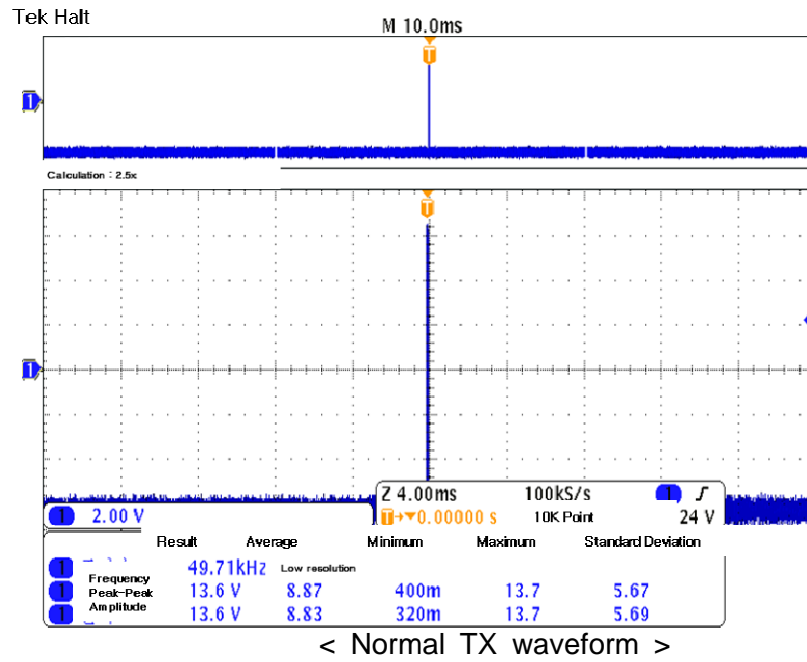
- RS-232



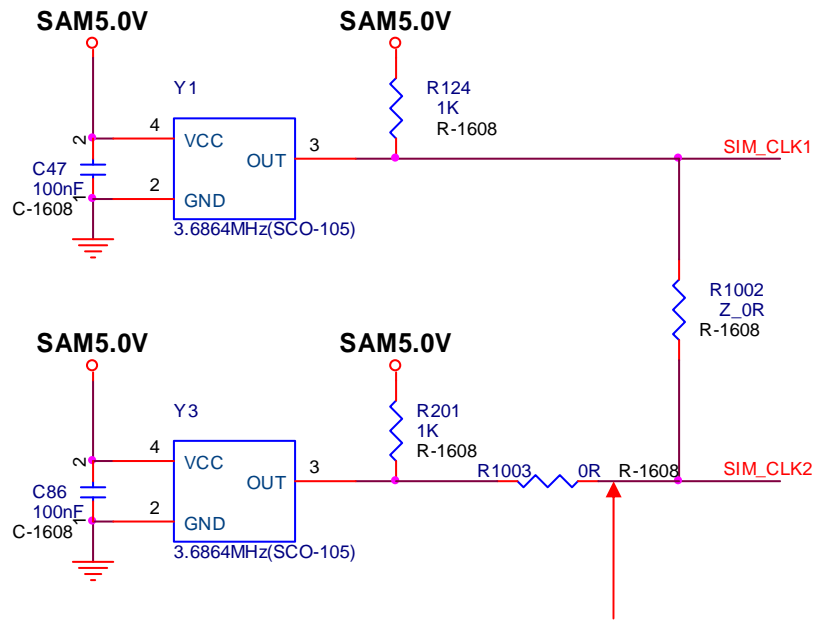
③ Circuit description
: Change UART signal into RS -232 signal

④ Waveform measurements



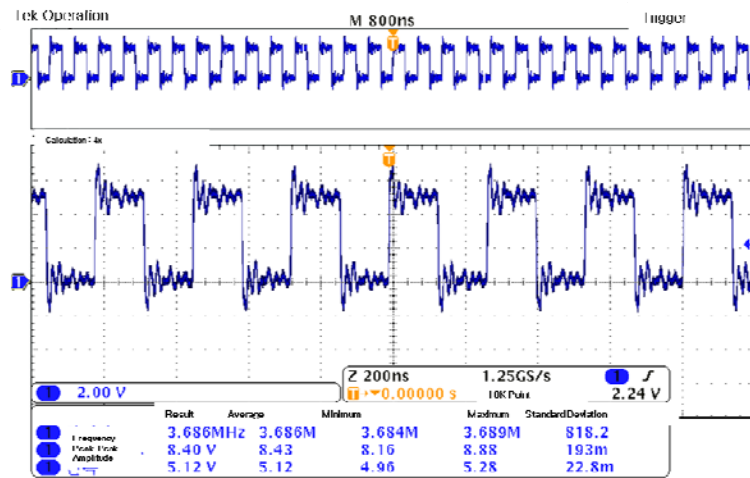


- SIM Part (Clock)



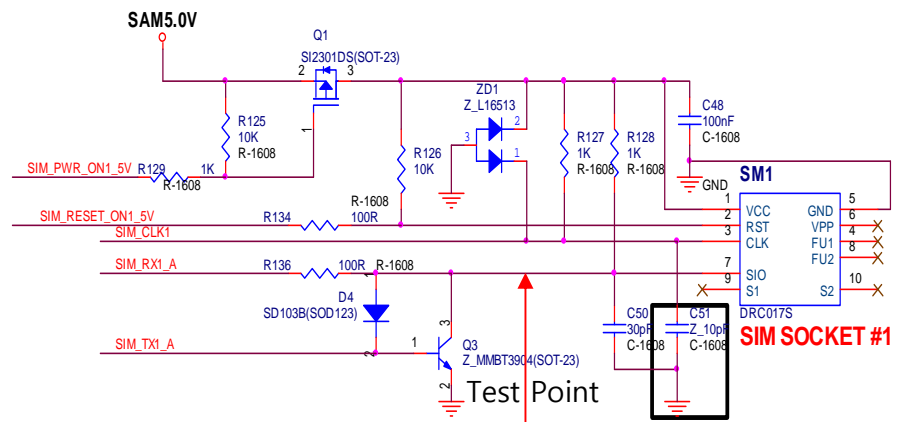
- ① Circuit description : Circuit that supply the stable Clock to allow SIM Card to operate.

② Waveform measurements



<Normal Clock Wavement>

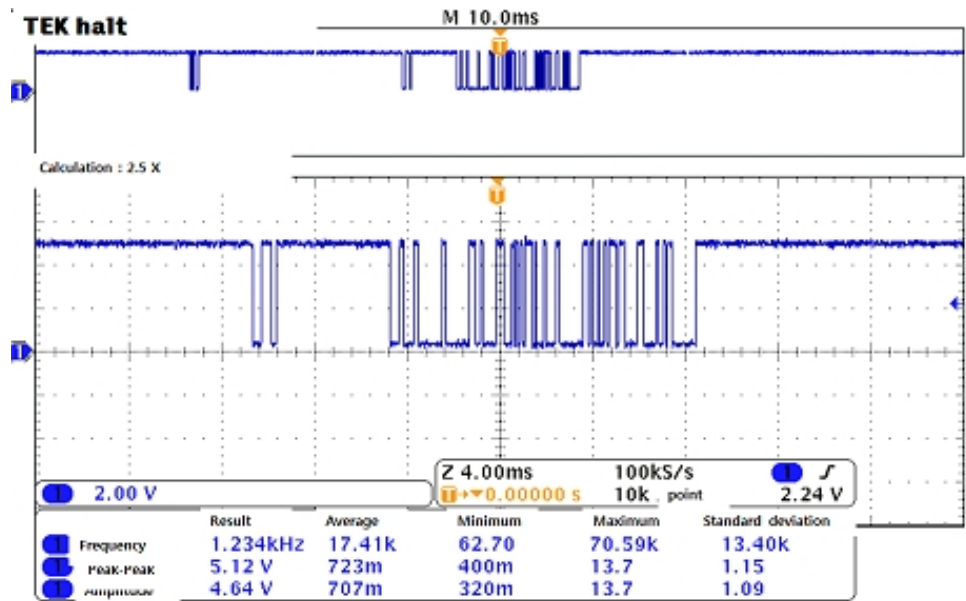
- SIM Part (Signal)



① Circuit description

: Circuit that realize to recognize SIM CARD

② Waveform measurements



<Waveform when normally recognize SIM CARD>

FCC Statement

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.

Any changes or modifications to the equipment 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.