Mars1417V User Manual

To Customers

Congratulations on your purchase of iRay Mars1417V Digital Flat Panel. At iRay, we strive to not only make the world-class products that deliver the best value to our users but also offer the highest quality of service and customer care. Please take time to read user manual to utilize the product effectively. We hope you enjoy the experience with Mars1417V.

If you have any questions or suggestions, please feel free to contact us.

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Notes on usage and management of the equipment

- Read all of the instructions in user manual before operation. Give particular attention to all safety precautions.
- Only a physician or a legally certified operator could use the product.
- The product should be maintained in a safe and operable condition by maintenance personnel.
- Use computers and image display monitors complying with IEC 60601-1 or IEC 60950-1. For details, consult our sales representative or local iRay dealer.
- Use dedicated cables. Do not use any cables other than those supplied with the product.
- Request your sales representative or local iRay dealer to install the product

Caring for your environment

This symbol indicates that this product is not to be disposed of with your residential or commercial waste.

Recycling iRay Equipment

Please do not dispose of this product with your residential or commercial waste. Improper handling of this type of waste could have a negative impact on health and on environment. Some countries or regions, such as the European Union, have set up systems to collect and recycle electrical or electronic waste. Contact your local authorities for information about dropping off waste product for recycling . If collection systems are not available, call iRay Customer Service for assistance.

Disclaimer

1. iRay shall not be liable to the purchaser of this product or third parties for any damage, loss, or injury incurred by purchaser or third parties as a result of fire, earthquake, any accident, misuse or abuse of the product.

2. iRay shall not be liable to any damage, loss, or injury arising from unauthorized modifications, repairs, or alterations to the product or failure to strictly comply with iRay's operating and maintenance instructions.

3. iRay shall not be liable for any damage or loss arising from the use of any options or consumable products other than those dedicated as Original products by iRay Technology.

4. It is the responsibilities of user or physician to maintain the privacy of image data and provid medical care services. iRay shall not be responsible for the legality of image processing , reading and storage nor it shall be responsible for loss of image data for any reason.

5. Information regarding specification, compositions, and appearance of this product is subject to change without prior notice.

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Trademarks

- The iRay name and iRay logo are registered trademarks of Shanghai iRay Technology Ltd.

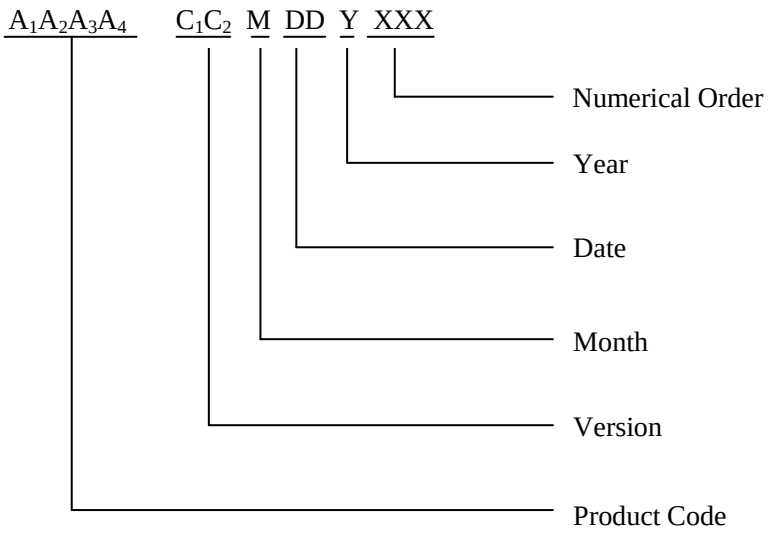
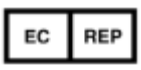
Symbols and Conventions

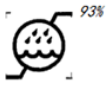
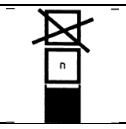
The following symbols and conventions are used in user manual.

	This symbol is used to identify conditions under which improper use of the product may cause death or serious personal injury.
	This notice is used to identify conditions under which improper use of the product may cause minor personal injury.
	This notice is used to identify conditions under which improper use of the product may cause property damage.
	This is used to indicate a prohibited operation.
	This is used to indicate an action that must be performed.
	This is used to indicate important operations and restrictions.
	This is used to indicate operations for reference and complementary information.
	This symbol indicates the name and address of manufacturers.

Labels and Markings

The contents of the labels and markings on Mars1417V product are indicated below:

	Caution: please refer to the instructions in user manual.
	This symbol indicates that the product has passed CE certification and followed by CE number.
	This symbol is used to identify the manufacture series number which is after, below or adjacent to the symbol. The series number of iRay products is usually made of thirteen digits as shown below: 
	This symbol indicates the name and address of manufacturer.
	This symbol indicates the name and address of iRay authorized representative in the European region.
	This symbol indicates consultation of user manual for general information.

	Safety Signs: please refer to user manual for safety instructions
	Safety Signs：Dangerous Voltage
	Handled with care
	This symbol indicates operational temperature limits.
	This symbol indicates storage temperature limits.
	This symbol indicates the product radiates wireless signal.
FCC	This symbol indicates the product has passed FCC certification.
	Fragile.
	Keep away from sunlight
	Keep dry
	This symbol indicates the humidity limits.
	Keep the product up right
	Do not roll the transportation package.
	This symbol indicates stacking limit number.

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1 Safety

1.1 Safety Precautions

Follow these safeguards and properly use the product to prevent injury and damage to it.

WARNING
Installation and environment of use • **Do not use or store the product near flammable chemicals such as alcohol, thinner, benzene, etc.** If chemicals are spilled or evaporated, it may result in fire or electric shock through contact with electric parts inside the product. Also, some disinfectants are flammable. Be sure to take care when using them. • **Do not connect the product with anything other than specified.** Doing so may result in fire or electric shock. • **All patients with active implantable medical devices should be kept away from the product.**
Power supply • **Do not operate the product with power supply other than the one indicated on the rating label.** Otherwise, it may result in fire or electric shock. • **Do not handle the product with wet hands.** You may experience electric shock that could result in death or serious injury. • **Do not place heavy object on cables and cords. Do not pull, bend, bundle, or step on them to prevent their sheath from being damaged, and do not alter them neither.** Doing so may damage the cords which could result in fire or electric shock. • **Do not supply power to more than one piece of product with the same AC outlet.** Doing so may result in fire or electric shock. • **Do not turn on system power when condensation has formed on the equipment.** Doing so may result in fire or electric shock. • **Do not connect multiple portable socket-outlets or extension cords to the system.** Doing so may result in fire or electric shock.

- **To avoid the risk of electric shock, this product must only be connected to power supply with protective earth.**

  Not doing so may result in fire or electric shock.

- **Securely plug the power cord into the AC outlet.**

  If contact failure occurs, or if metal objects come into contact with exposed metal prongs of the plug, fire or electric shock may result.
- **Be sure to turn off the power before connecting or disconnecting the cords.**

  Otherwise, you may get an electric shock that could result in death or serious injury.
- **Be sure to hold the plug or connector to disconnect the cord.**

  If you pull the cord, the core wire may be damaged, resulting in fire or electric shock.

WARNING

Handling

- **Never disassemble or modify the product. No modification is allowed.**

  Doing so may result in fire or electric shock. Also, since the product incorporates parts that may cause electric shock as well as other hazardous parts, touching them may cause death or serious injury.
- **Do not place anything on top of the product.**

  The object may fall and cause an injury. Also, if metal objects such as needles or clips fall into the product, or if liquid is spilled, it may result in fire or electric shock.
- **Do not hit or drop the product.**

  The product may be damaged if it receives a strong jolt, which may result in fire or electric shock if it is used without being repaired.
- **Do not put the product and pointed objects together.**

  The product may be damaged. If so, it should be used in bucky.

- **Have the patient take a fixed posture and do not let the patient touch parts unnecessarily.**

  If the patient touches connectors or switches, it may result in electric shock or malfunction.

When a problem occurs

- **Should any of the following occurs, immediately unplug the power cord of adaptor or battery, and contact your sales representative or local iRay dealer:**

When there is smoke, an odd smell or abnormal sound.

When liquid has been spilled into the equipment or a metal object has entered through an opening.

When the product has been dropped and damaged.

Maintenance and inspection

- **Please turn off power of the product and unplug power cord of adapter before cleaning.**
- **Never use alcohol, ether and other flammable cleaning agent for safety. Never use methanol, benzene and acid because they would corrode the equipment.**
- **Don't dip the product into liquid.**
- **Please make sure that surface & plugs are dry before turning on.**

Otherwise, it may result in fire or electric shock.

- **Clean the plug of the power cord periodically by unplugging it from the AC outlet and removing dust or dirt from the plug, its periphery and AC outlet with a dry cloth.**

If the cord is kept plugged in for a long time in a dusty, humid or sooty place, dust around the plug will attract moisture; this could cause insulation failure that may result in a fire.

- **For safety reasons, be sure to turn off the power when performing inspections indicated in this manual.**

Otherwise, electric shocks may occur.

CAUTION

Installation and environment of use

- **Do not install the product in any of the locations listed below. Doing so may result in failure, malfunction, falling, fire or injury.**

Close to facilities where water is used

Where it will be exposed to direct sunlight

Close to the air outlet of an air-conditioner or ventilation equipment

Close to heat source such as a heater

Where the power supply is unstable

In a dusty environment

In a saline or sulfurous environment

Where temperature or humidity is high

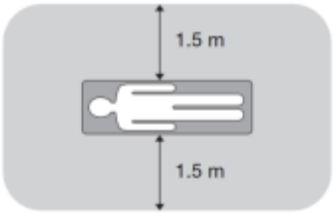
Where there is freezing or condensation

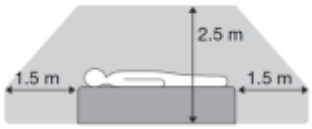
In areas prone to vibration

On an incline or in an unstable area

- **Take care that cables do not become tangled during use. Also, be careful not to get your feet caught by cable.**

  Otherwise, it may cause a malfunction of the product or injury of the user due to tripping over the cable.
- **Non-medical equipment such as battery charger, access point and infrared register tools cannot be used in patient's vicinity.**





Power supply

- **Always connect three-core power cord plug to a grounded AC power outlet.**
- **To make it easy to disconnect the plug at any time, avoid putting any obstacles near the outlet. Otherwise, it may not be possible to disconnect the plug in an emergency.**
- **Be sure to ground the product to an indoor grounded connector. Also, be sure to connect all the grounds of system to common ground.**
- **Do not use any power source other than the one provided with the product.**

  Otherwise, fire or electric shock may be caused due to leakage.

Handling

- **Do not spill liquid or chemicals on product. In case the patient is injured, it is not allowed to contact product with blood or other body fluids.**

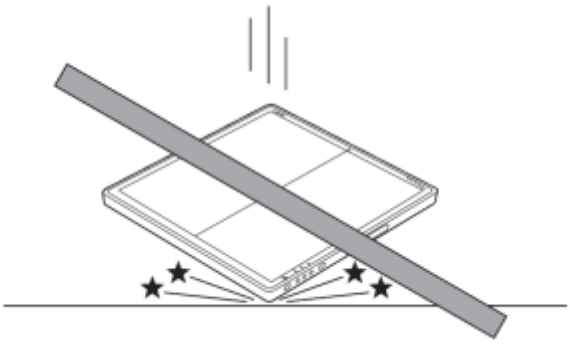
  Doing so may result in fire or electric shock.

  In situation, protect the product with a disposable cover as necessary.
- **Turn off the power and pull out the plug when not used.**

CAUTION

Handling

- **Handle the product carefully.**
- **Do not submerge the product in water.**
- **The internal image sensor may be damaged if something hits against it or it is dropped. If the product is dropped, the drop sensor inside would record and the product would not be warranted by iRay.**



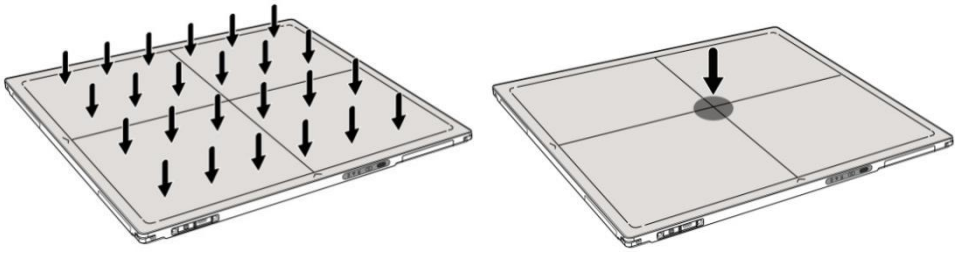
- **Do not place excessive weight on the panel.**

  Otherwise, the internal image sensor may be damaged and image may be incorrect.

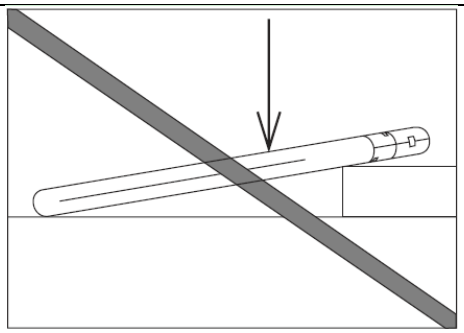
  <Load Limit>

  Uniform load：100 kg over the whole area of the surface.

  Local load：40 kg on an area 4 cm diameter.



- **Be sure to use the product on flat surface so it would not bend. Otherwise, the internal image sensor may be damaged. Be sure to securely hold the product while using it in upright positions. Otherwise, the product may fall over, resulting in injury to user or patient, or may flip over, resulting in damage to the inner device.**



Keep the same load on the product when acquiring image. The image will be incorrect.

CAUTION

CAUTION

- Do not close to fire, do not use in high temperature
- Do not invert positive and negative pole
- Do not contact with metal in case of short circuit
- Do not insert sharp objects into battery
- Do not beat battery
- Do not stand on battery
- Do not use battery out of rules
- Do not dispose of battery or change inner structure
- Do not submerge battery in water, please keep dry in storage and do not contact with water in use
- Please charge battery with charger following GB 9706.1 Standards provided by us
- Do not mix battery with ones not provided by our company
- Do not charge battery with broken charger.

1.2 Notes for Using

When using the product, take the following precautions. Otherwise, problems may occur and the product may not function correctly.

Before exposure

- Be sure to check the product daily and confirm it work properly.
- Sudden heating of the room in cold areas will cause condensation on the product. In this case, wait until the condensation evaporates before performing an exposure. If it is used when condensation is formed, problems may occur in the quality of captured images. When an air-

conditioner is used, be sure to raise/lower the temperature gradually to prevent condensation.

- The product should be warmed up for 15 minutes before exposure or updating the gain map and defect map.
- Make sure exposure rate is over 900nGy/s @70KV.
- Make sure wave form of the energy going to the X ray tube is square not pulse.
- Be cautious with circumstance that someone has radio isotope recently injected into them, it may cause panel transmit image without x ray.

During exposure

- Do not move Power Cable or Ethernet Cable during exposure, or it may cause image noise or artifacts, even incorrect images.
- Do not use the product near the equipment generating a strong magnetic field. Otherwise, it may cause image noise, artifacts or even incorrect images.

After Usage

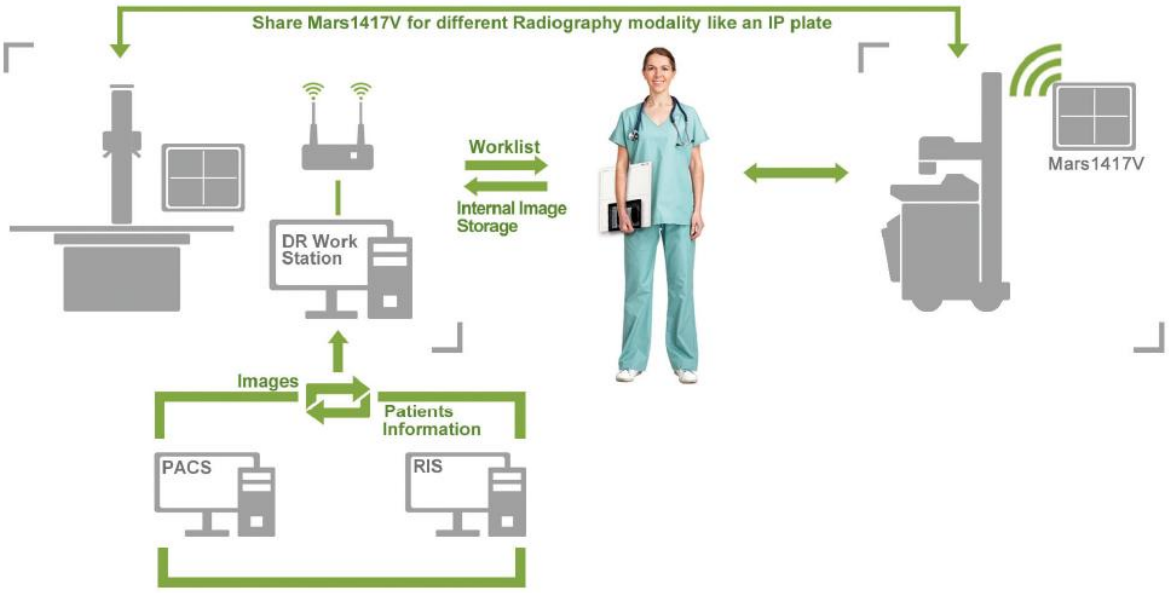
- After every examination, wipe the patient contact surfaces with disinfectants such as ethanol, to prevent the risk of infection. For details on how to sterilize, consult a specialist.
- Do not spray the product directly with disinfectants or detergents.
- Wipe it with a cloth slightly damped with a neutral detergent. Do not use solvents such as alcohol, benzene and acid. Doing so may damage the surface of the product.
- It’s recommended to use a waterproof non-woven cover as the isolated layer between product and the blooding patient.
- It’s strongly recommended to remove battery from panel if panel is not used more than 5 days. If battery stores for a long time, it should be charged (30% to 50%) every 3 month or charged (50% to 70%) every 6 month.

2 General Description

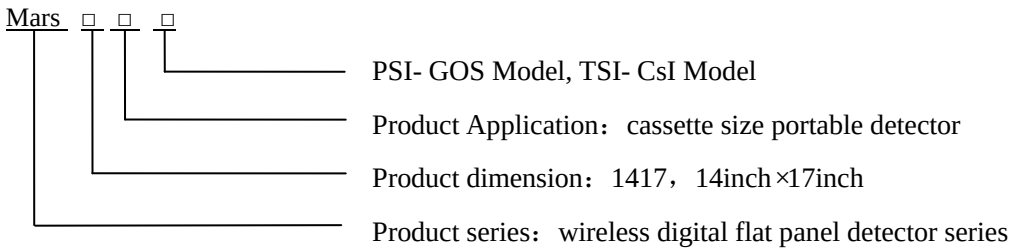
Mars1417V is a cassette-size wireless X ray flat panel detector based on amorphous silicon thin-film transistor technologies. It is developed to provide the highest quality of radiographic image, which contains an active matrix of 2304×2800 with 150um pixel pitch. Panels' scitinator has two options which are Standard GOS(Gadolinium Sulfoxylate) and CsI(Caesium Iodide). However the most great improvement is Mars1417V supports wireless communication between panel and Workstation. Mars1417V's power supply includes battery. Mars1417V can be used as a real portable panel.

2.1 Scope

This manual contains information about the Mars1417V. Information in the manual, including the illustrations, is based on prototype. If your configuration does not have any of these items, information about these items does not apply to your panel.



2.2 Model



Product Type: Battery-KV---------Rechargeable lithium battery

Product Type: Charger-KV--------Battery charger

2.3 Characteristic

- Wireless static flat panel detector used for general radiography.
- Cassette-size
- Sync-shot exposure trigger
- GOS or CsI scintillation screen.
- Easy to change the cable and update firmware.
- Battery recycling

2.4 Intended use

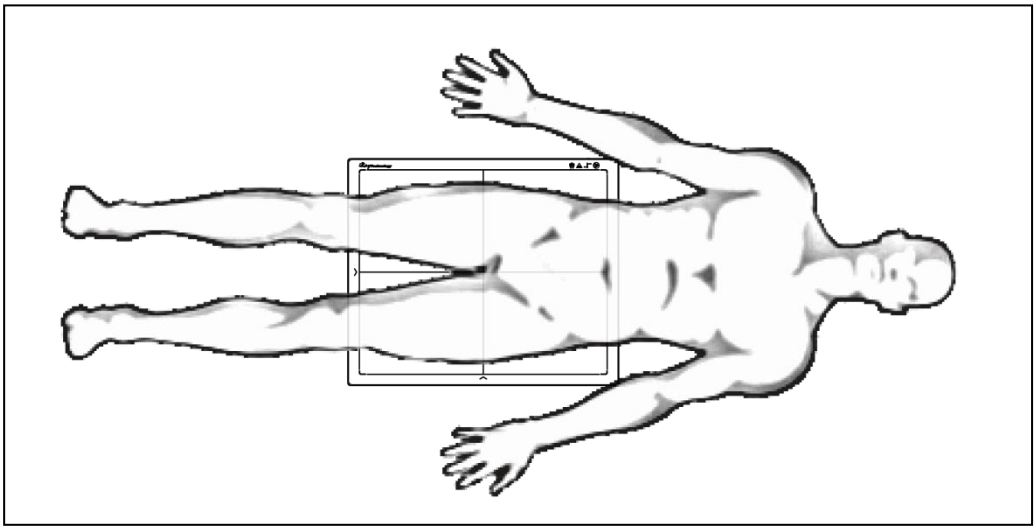
This panel provides digital X ray imaging for diagnosis of disease, injury, or any applicable health problem. The image is obtained as the result of X ray passing through the human body and detected by . The panel is intended to be used in holder or bucky which is well insulated to panel. The holder or the bucky is well grounded.

iRay would provide hardware and software support for integration of system. The length of both Ethernet Cable and Power Cable cannot exceed 3.5 m. Or the impedance of protective earth connections may exceed the safety threshold.

This panel is not intended for mammography or dental applications.

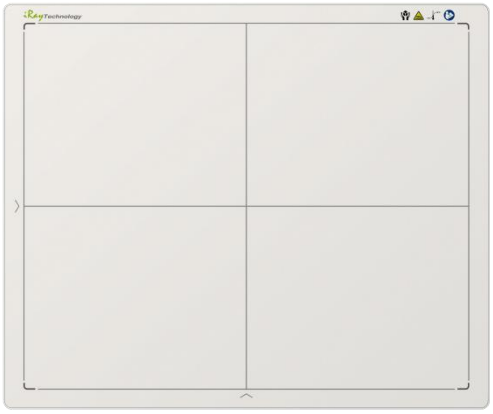
2.5 The relative position between patient and detector

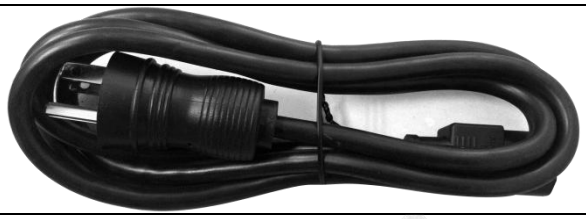
Because of the crosstalk effect of Amorphous silicon flat-panel detector, Pay attention to the relative position of patient and detector, the recommended position as shown below, Otherwise, the image is prone to abnormal light lines.

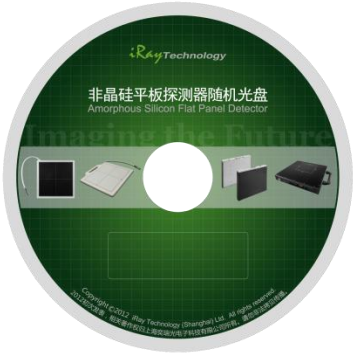


2.6 Product Components

Mars1417V comes with both DC power supply and battery package. Once powered on, it would build a connection with Workstation through Ethernet cable or Wireless connection.

Item		Description
Mars1417V Detector		1pcs Main Unit
Medical Adapter for • Detector and • Battery Charger		1 pcs DC 24V

Battery		2 pcs Battery pack
Ethernet Cable		1pcs 3.5 m
Gigabit Ethernet Cable		1pcs 3 m
AC Power Cable		1 pcs
DC Power Cable		1 pcs 3.5 m

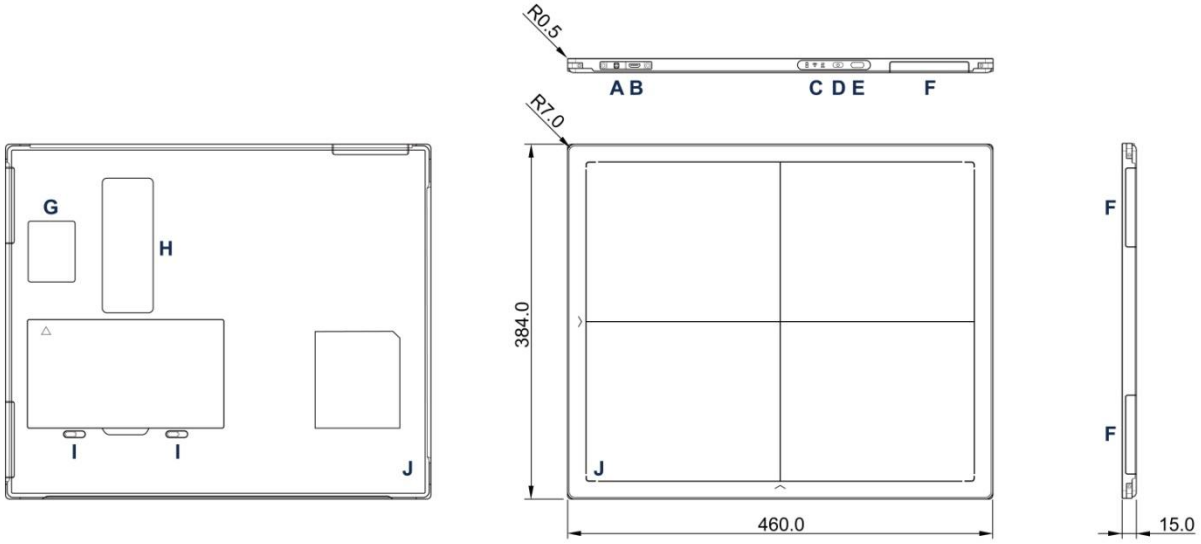
Battery Charger		1pcs
CD-Rom		1pcs Gain correction data Defect correction map SDK Manual

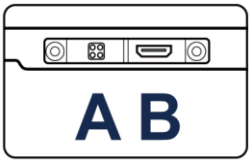
2.7 Optional Product Component

	Item	Description
Wireless AP Device		1pcs
Infrared Device		1pcs

2.8 Components Description

2.8.1.1 **Detector**



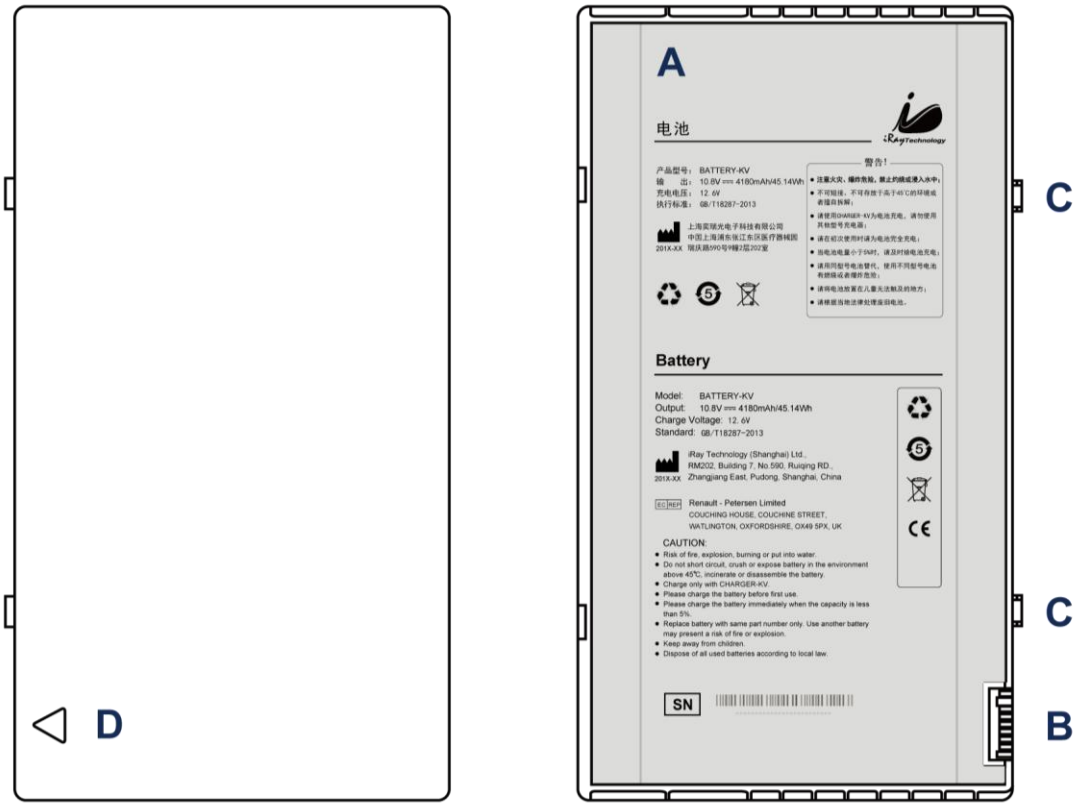


External Signals Input

Control Panel

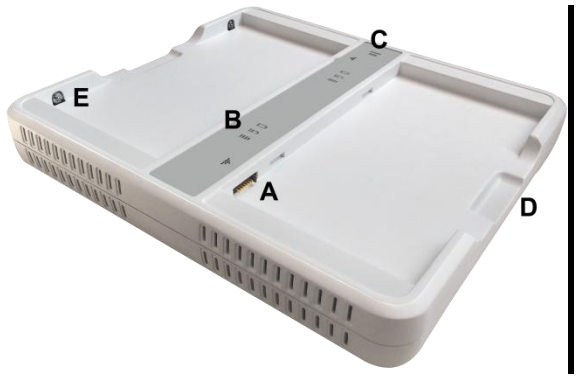
Item	Name	Description
A	DC Jack	24V DC input
B	Ethernet Interface	Gigabit Ethernet Wire
C	Detector Indicator	Detector indicator of control panel
D	Power Button	Power button of control panel
E	Infrared Window	Infrared device window
F	Antenna	Antenna
G	Reserved	/
H	Maintenance Cover	For service engineer to maintenance
I	Battery Lock	The lock button for detaching battery
J	Detector Label	Product information.

2.8.1.2 **Battery**



Item	Name	Description
A	Battery Label	/
B	Battery Interface	8 Pin Battery connector
C	Pilot Pin	/
D	Indicator	Installation direction indicator

2.8.1.3 **Battery Charger**



Item	Name	Description
A	Battery Interface	8 Pin Battery connector
B	Capacity Indicator	The indicator definition is as follow
C	Power Indicator	The indicator definition is as follow
D	Hand Pull Position	/
E	The limit ball plug	/
F	DC Jack	24V DC input

Power indicator definition:

Power Indicator	Lighting Status	Operating Status
OFF		No external DC adaptor input
GREEN		External DC adaptor input

The battery charging capacity indicator definition:

X Group Indicator	Lighting Status	Operating Status
I, II and III grid off		No battery Insert

I grid blinking II and III grid off		Battery Insert with capacity ≤30%，charging
II grid blinking I and III grid off		Battery Insert with capacity >30% and ≤60%，charging
III grid blinking I and II grid off		Battery Insert with capacity >60% and ≤95%，charging
I and II grid off III grid on		Battery Insert with capacity >95% and charging, when capacity = 100%, charging stops

2.8.1.4 **Power Supply**

Mars1417V supports both DC Power and Battery package input.

2.8.1.5 **Infrared Device**

Mars1417V does not include Infrared Device. User can choose by themselves, however some basic requirements should be followed.

2.9 Product Specification

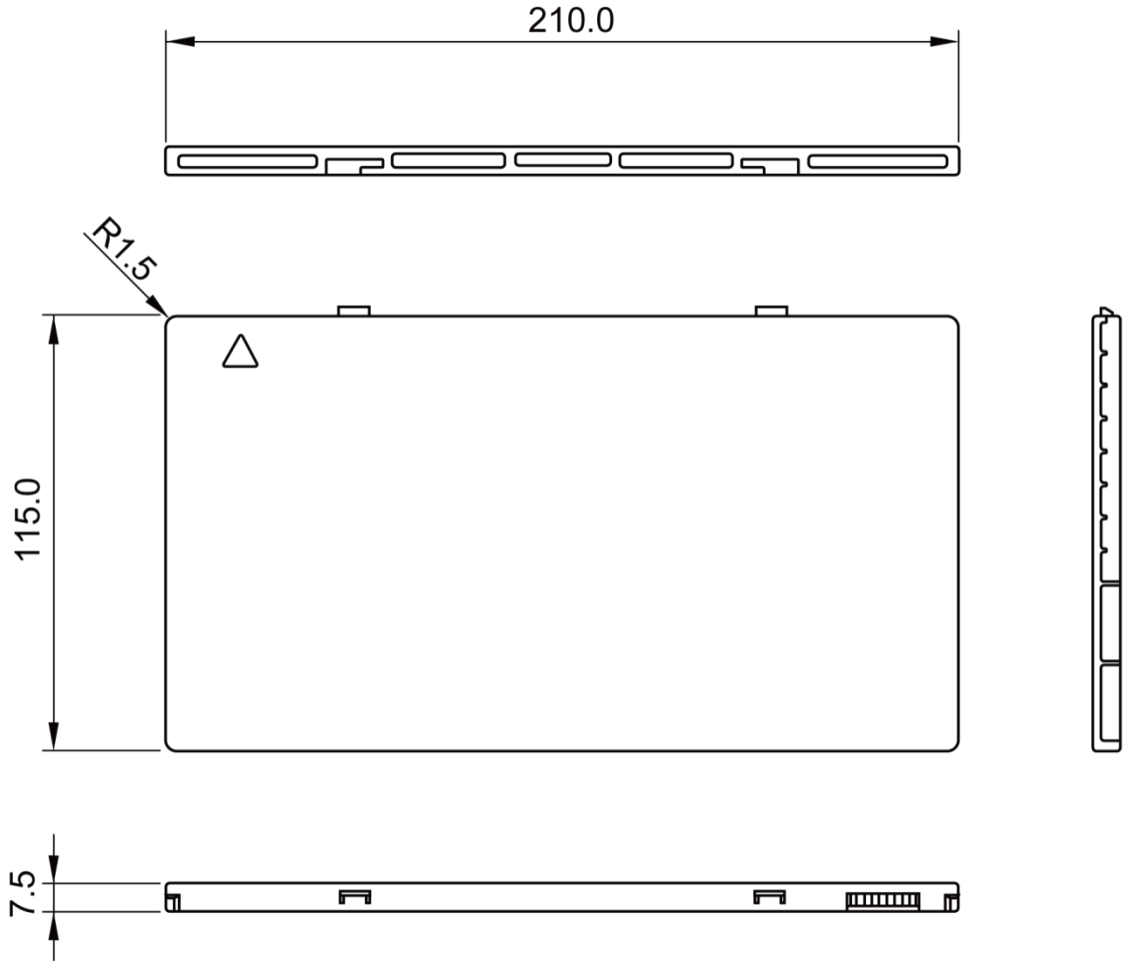
2.9.1 Detector

2.9.1.1 **Basic**

Item	Specification
Model	Mars1417V-PSI (GOS) Mars1417V-TSI (CsI)
Image Sensor	a-Si (Amorphous Silicon) TFT
Pixel Size	150 μm
Effective Array	2304 x 2800
Effective Area (H x V)	343 x 416 mm
Gray scales	14bit

Spatial Resolution	2.8 Lp/mm (Standard GOS) 3.1Lp/mm (CsI).
Image Acquisition Time (Wired)	Preview Acquisition Time : 3 sec. Processed Acquisition Time : 6 sec. (including Preview Time)
Image Acquisition Time (Wireless) Both AP mode and Client mode	Preview Acquisition Time : 5 sec. Processed Acquisition Time : 9 sec. (including Preview Time)
Cycle Time	Min. 13s @Wired;Min.16s @Wireless
Power Consumption	Max. 13W
Dimension (L ×W ×H)	460 x 384 x 15.2 mm
Weight (with one battery)	Mars1417V-PSI: 3.28 kg without battery, 3.5 kg with battery Mars1417V-TSI: 3.38 kg without battery, 3.6 kg with battery
Image Transfer	Wired : Ethernet(100BASE-T) Wireless : IEEE802.11a/b/g/n
Data Transmission Rate (Wireless)	802.11b : Max. 11Mbps 802.11a/g : Max. 54Mbps 802.11n : Max. 300Mbps (MIMO 2x2)
X ray Energy	40kV to 150kV
X ray Dose	100nGy to 60μGy

2.9.2 Battery



Item	Specifications
Model	Battery-KV
Rated Capacity	Min. 3950mAh, Typ. 4180mAh @ Discharge 0.2C
Nominal Voltage	10.8V
Charge Voltage	12.6±0.05V
Discharged End Voltage	8.25V
Charging Method	CC-CV
Operating Temperature	Charge 0℃-+45℃, Discharge -20℃-+60℃
Storage Temperature	1 month -20℃-+40℃ 3 month -20℃-+40℃ 6 month -20℃-+20℃

Relative Humidity	65±20%
Dimension (L ×W ×H)	210 x 115 x 7.5 mm
Weight	0.29kg

2.9.3 Battery Charger

Item	Specifications
Model	Charger-KV
Simultaneous Charging	2 battery packs
Full charging time	2 hours
Rated power supply	24V(DC)
Dimension (L ×W ×H)	300 x 263 x 42 mm
Weight	1.26 kg

2.9.4 Power supply

Mars1417V supports both DC Power and Battery package input.

Item	Specifications
DC Power	24V(DC), 0.75A
Battery Package	10.8V(DC),1.5A

2.9.5 Infrared Device (Optional)

Mars1417V does not include Infrared Device. User can choose by themselves, however some basic requirements should be followed.

Item	Specifications
IRDA Protocol	Compliant with IrDA V1.0 and V1.1
USB	Compliant with USB V2.0 and V1.1
Data Rate	Max. 4Mbps

2.9.6 AP Router (Optional)

Mars1417V do not include AP Router. Users can choose AP Router as they wish, however specification below is a requirement.

Item	Specifications
Wireless Standard	IEEE 802.11 a/b/g/n
Frequency Range	2.412 ~ 2.4835 GHz and 5.15 ~ 5.85 GHz
Wireless Data Rate	802.11b : Max. 11Mbps 802.11a/g : Max. 54Mbps 802.11n : Max. 300Mbps (MIMO 2x2)
Wired Data Rate	Max. 1Gbps

2.9.7 Wireless Communication

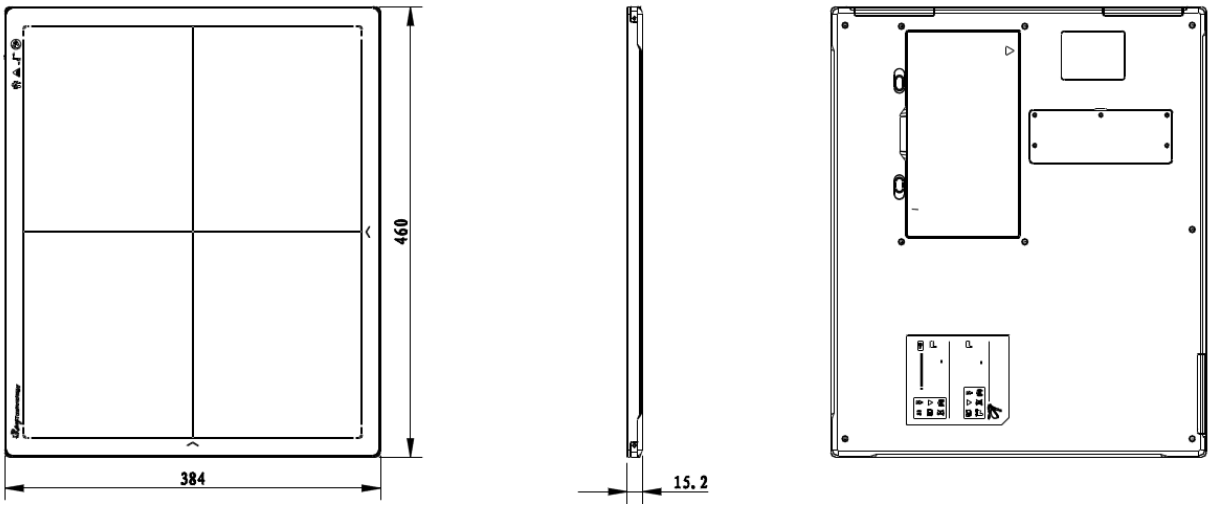
Item	Description
Wireless Standard	IEEE802.1a/b/g/n
Frequency Range	2.4G: 2.412 ~ 2.4835 GHz 11: (Ch. 1-11) – United States 13: (Ch. 1-13) – Europe 14: (Ch. 1-14) – Japan 5G: 5.15 ~ 5.85 GHz 12: United States 19: Europe 8: Japan
Data Transmission Rate	802.11b : Max. 11Mbps 802.11a/g : Max. 54Mbps 802.11n : Max. 300Mbps (MIMO 2x2)
Modulation	802.11b: CCK, DQPSK, DBPSK 802.11a/g:

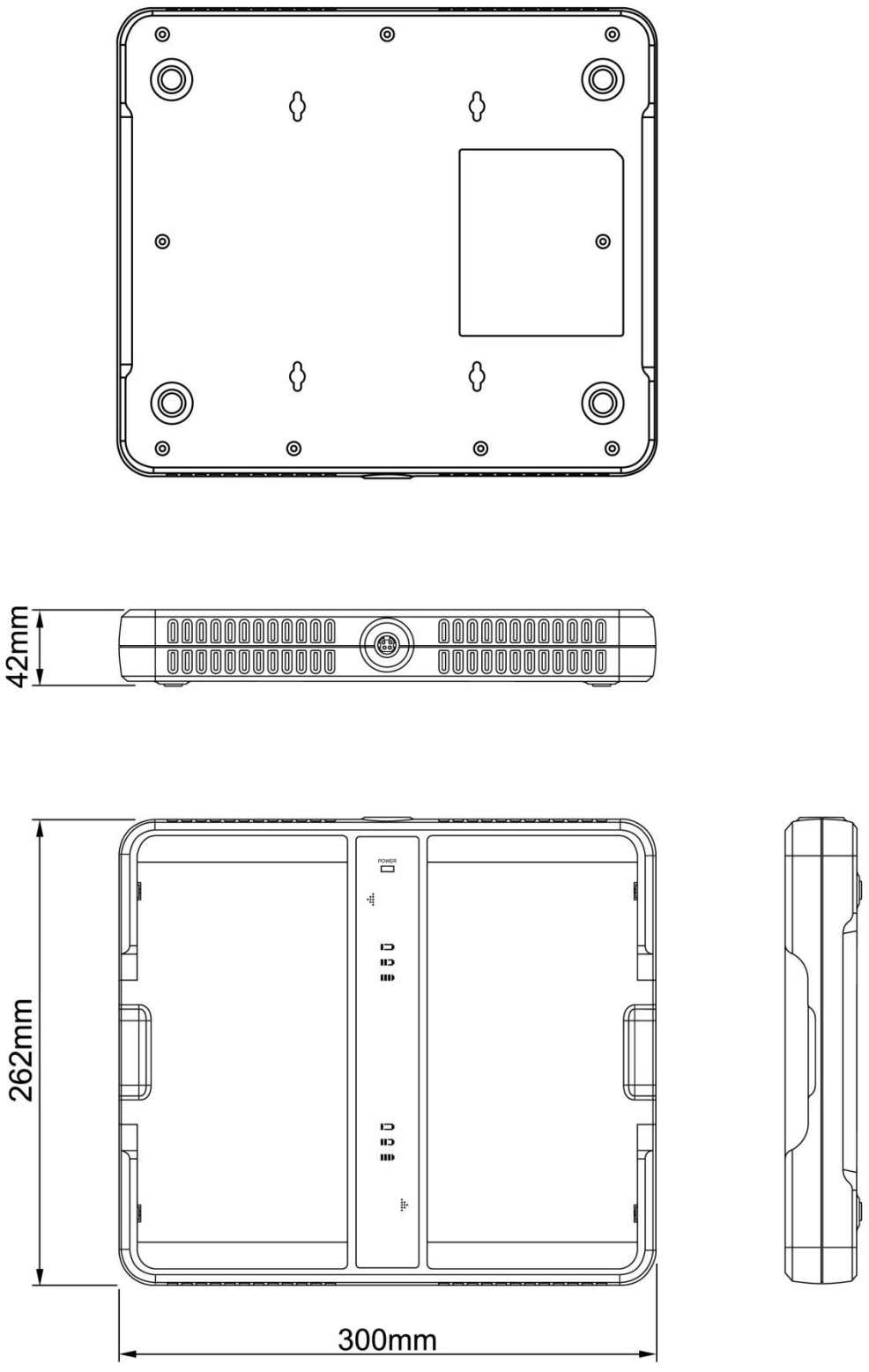
	64 QAM, 16 QAM, QPSK, BPSK 802.11n: 64 QAM, 16 QAM, QPSK, BPSK
Transmission Power	Max.17dBm
Security	WPA, WPA-PSK, WPA2, WPA2-PSK, WEP 64bit & 128bit
Antenna	2 Dual Band inner antenna

2.9.8 Recommended Application Condition

Item	Description
Operating System	Windows XP/7 32/64bit
CPU	Intel Core i73.6G
Memory	4G DDR3
Hard Disk	640 G
LAN Card	Intel Pro EXP9301CT PRO Gigabit Network Adapter with PCIe interface

2.9.9 Mechanical Outlines




42mm
262mm
300mm

2.9.10 Use Environment

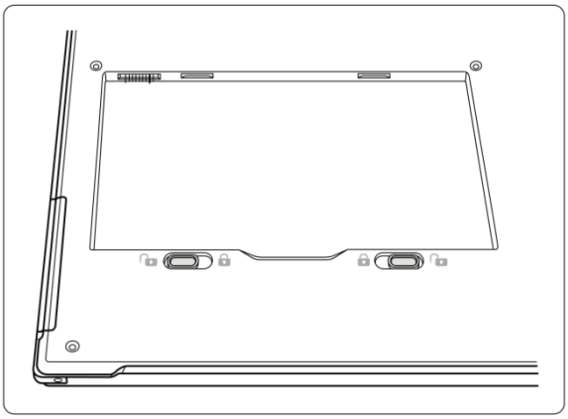
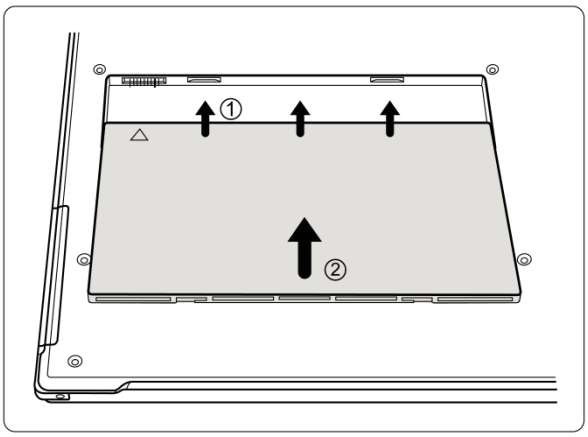
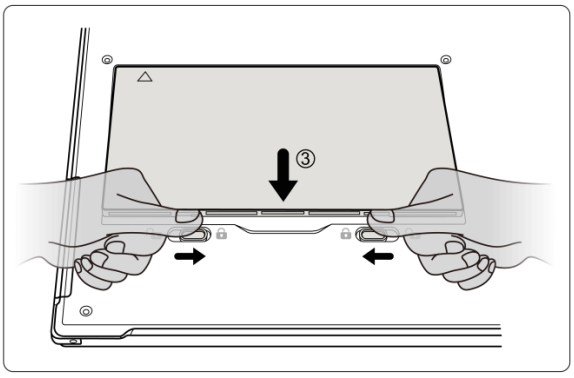
	Temperature	Temperature change	Humidity	Atmospheric Pressure	Pressure Change
Operating	5~30℃	<1k/min	45~85% RH	700~1000hPa1 0~70% RH	<10kp/min (1kp=1.0197E-5Pa)
Storage	-20~40℃	<1k/min	45~85%RH	700~1000hPa1 0~70% RH	<10kp/min (1kp=1.0197E-5Pa)

3 Installation

3.1 Panel Installation

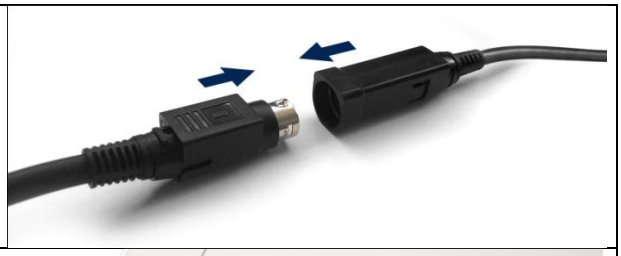
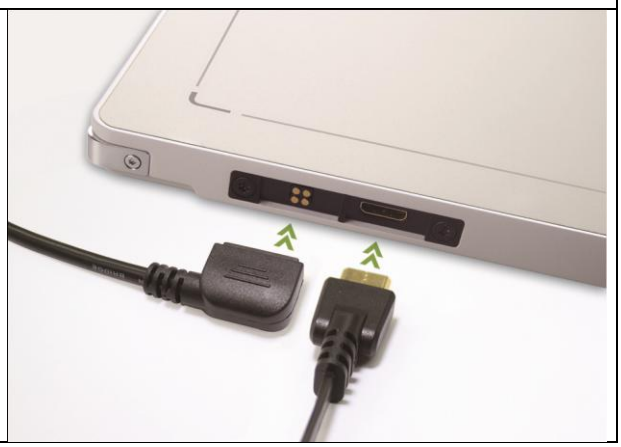
3.1.1.1 Attach Battery Pack

Mars1417V can be powered by both battery package and DC power. Once battery package is inserted or DC power is on, Panel would be activated immediately. If none of battery and DC power is on, Mars1417V would power off. Please see below for battery installation.

Make sure that the connectors on the battery package are pointed to the cave in battery compartment.	
Slide battery package into battery compartment （Make sure battery capacity overpass 10%）.	
Slide the battery lock lever.	

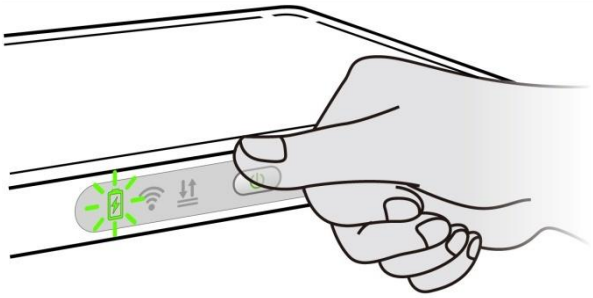
3.1.1.2 Attach DC Power

Please see below for DC power installation.

Connect one end of DC Power Cable to the Medical Adapter	
As figure is power interface and Ethernet interface	
Connect another end of DC Power Cable to the DC input of the detector. If user wants to use wired Ethernet, connect the Ethernet Cable to Ethernet interface.	

3.1.1.3 **Booting Up**

On the control panel, user can press power button to power on/off.

If panel is powered off, user can press the button for 4 seconds to power on when battery is inserted and battery capacitor is no less than 10%, or DC power is connected. If panel is powered on, user can press the button for 4 seconds to shut down. On the other hand, it can also be used as reset inner control IC when button is active for 8s.	

After booting up, user can check the status LED indicator.

Power Indicator	Lighting Status	Operating Status		
		Operating	Battery Capacity	DC Input
OFF		Power OFF	/	/
Orange ON		Power ON	≤10%	NO
Green ON		Power ON	• Battery capacity >10%, no DC input • DC input , no Battery	
Orange Fast Blinking		Power OFF	≤10%	YES
Orange Slow Blinking		Power ON	≤10%	YES
Green Fast Blinking		Power OFF	>10%	YES
Green Slow Blinking		Power ON	>10%	YES
OFF after Green ON with 1 sec.		Power OFF	>10%	NO
OFF after Orange ON with 1 sec.		Power OFF	≤10%	NO

Link indicator is as table:

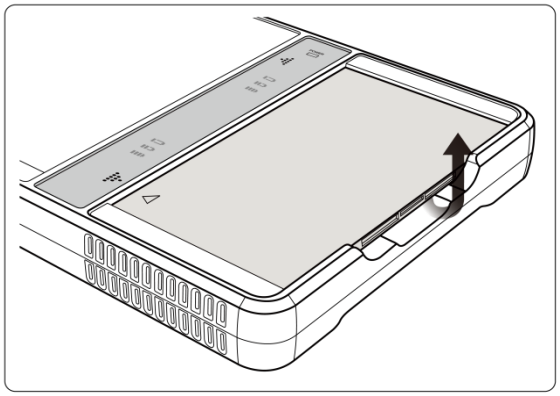
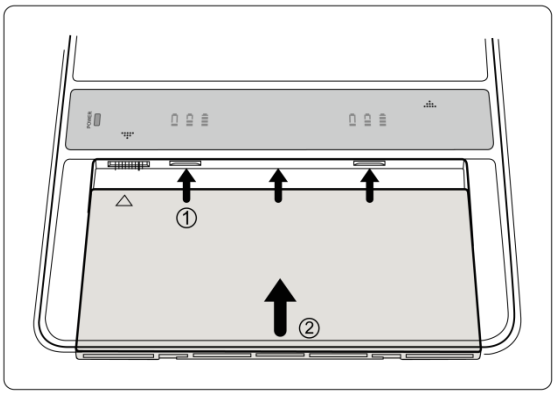
Link Indicator	Lighting Status	Description
OFF		• Shut down • wired connection broken and wireless connection not ready
Blue blinking		• Client mode, wireless connection is ready, but not connected
Blue ON		• Client mode, wireless connection is built • AP mode, wireless AP is ready

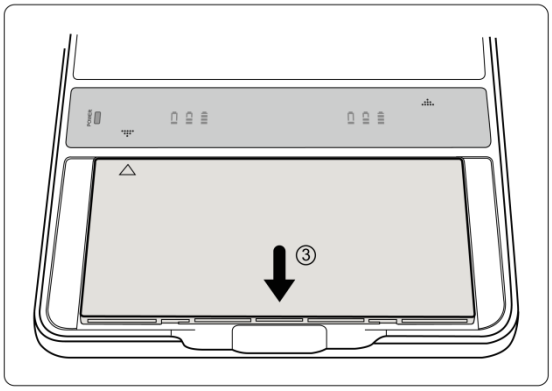
Green ON		• Wired Connection is built
Green blinking		• Panel Initialization • Infrared configuration

Status indicator is as table:

Status Indicator	Lighting Status	Description
OFF		• Shut down • Idle
Green ON		• Data Transmission
Orange blinking		• Fatal Error
Orange ON		• Initialization

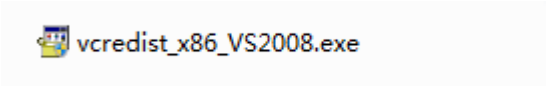
3.2 Battery Charger Installation

Operation	Figure
Unload Battery from battery charger.	
Insert battery into battery charger. Note the interface position as figure.	

Press the battery to the bottom of battery compartment.	

3.3 Software Installation

In the case of IDemo not work, please install following VC redistribute package.

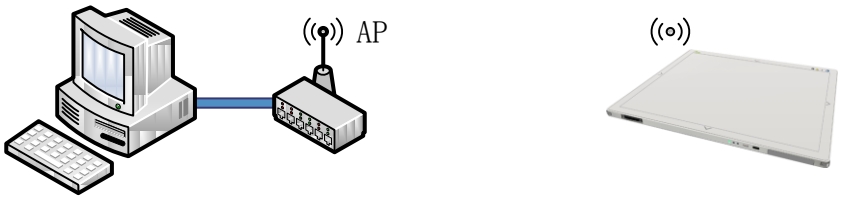


3.4 Panel Infrastructure

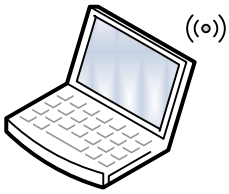
Mars1417V supports three connection modes as follows:

1) Wired connection mode

2) Wireless Client Mode



3) Wireless AP Mode



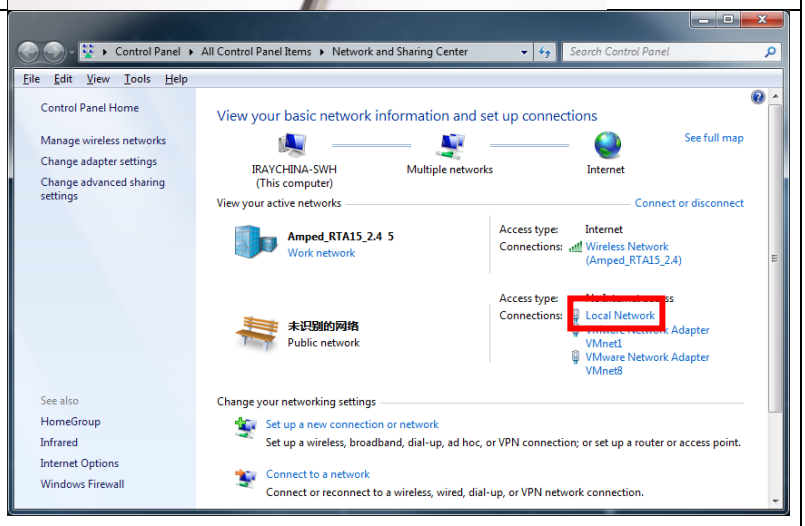
To build connection between workstation and Panel, User should follow steps below.

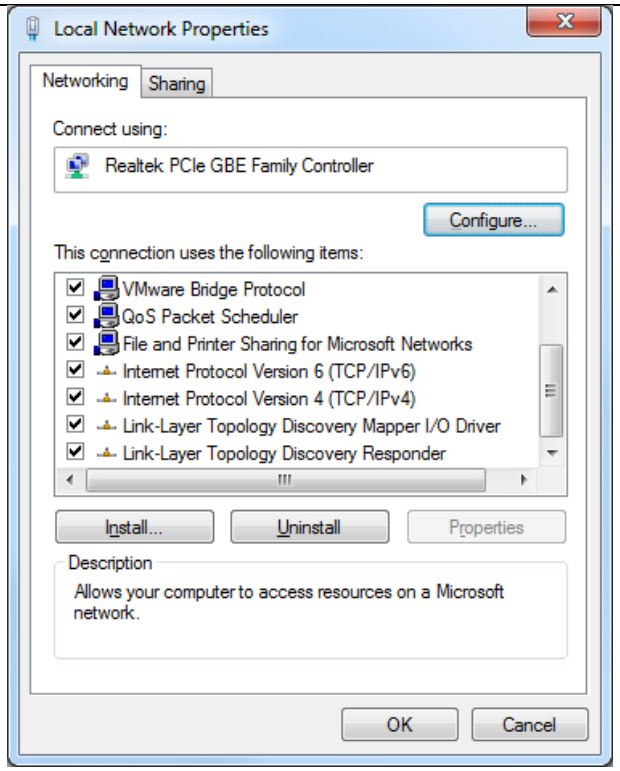
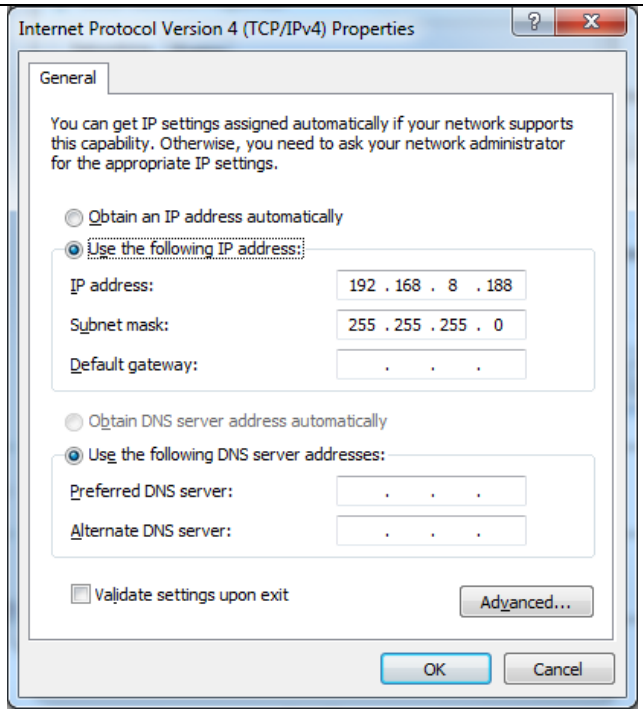
3.4.1.1 **Wired Mode**

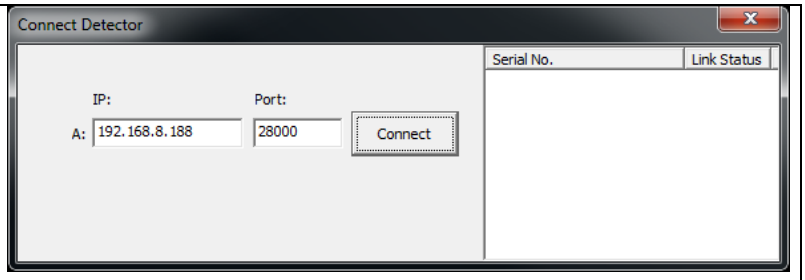
To complete Wired connection configuration, user has to finish actions listed below.

Configuration of Ethernet Card

To begin configuration of Ethernet Card, user should finish chapter 3.1

Connect panel to Workstation with Ethernet Cable	
Open local network management interface	

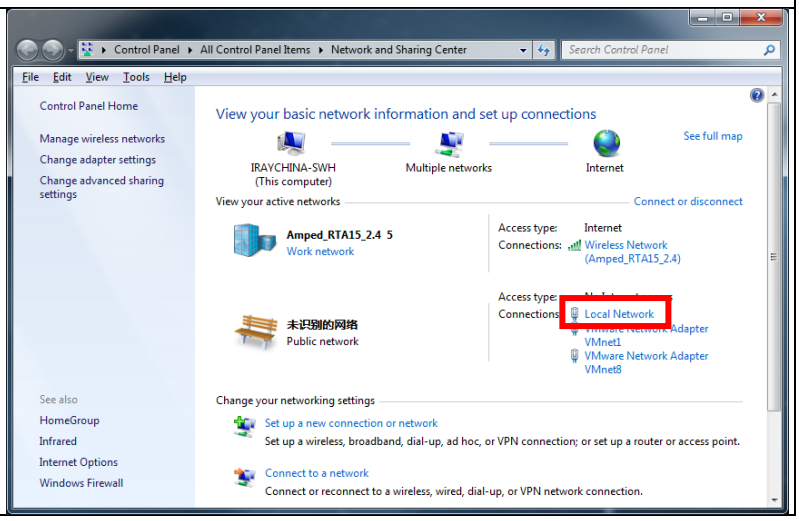
Open Local network configuration	
open IPV4 setting	
IP setting Network mask setting	IP address: 192.168.8.188 Subnet mask: 255.255.255.0

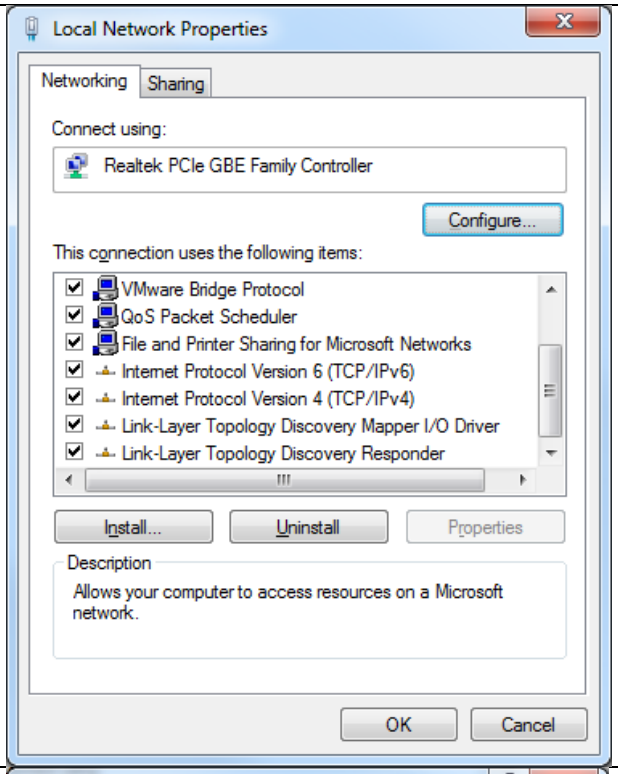
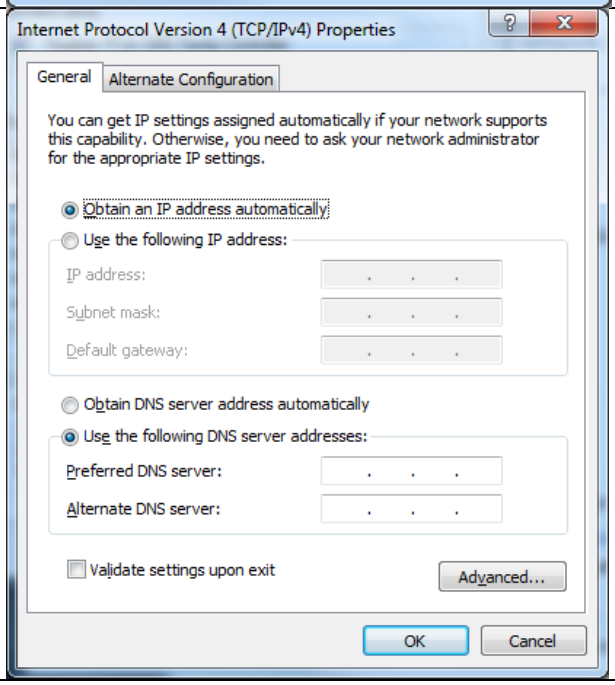
Open SDK and start connection	
IP and port setting	IP: 192.168.8.188 Port: 28000

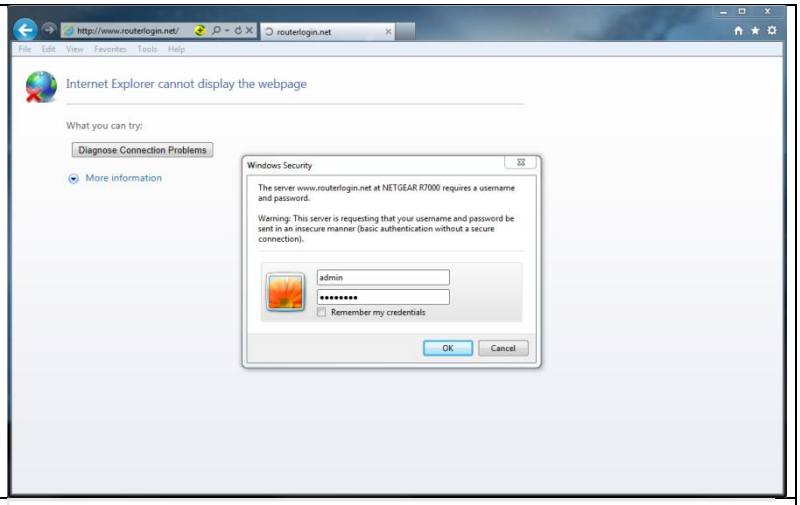
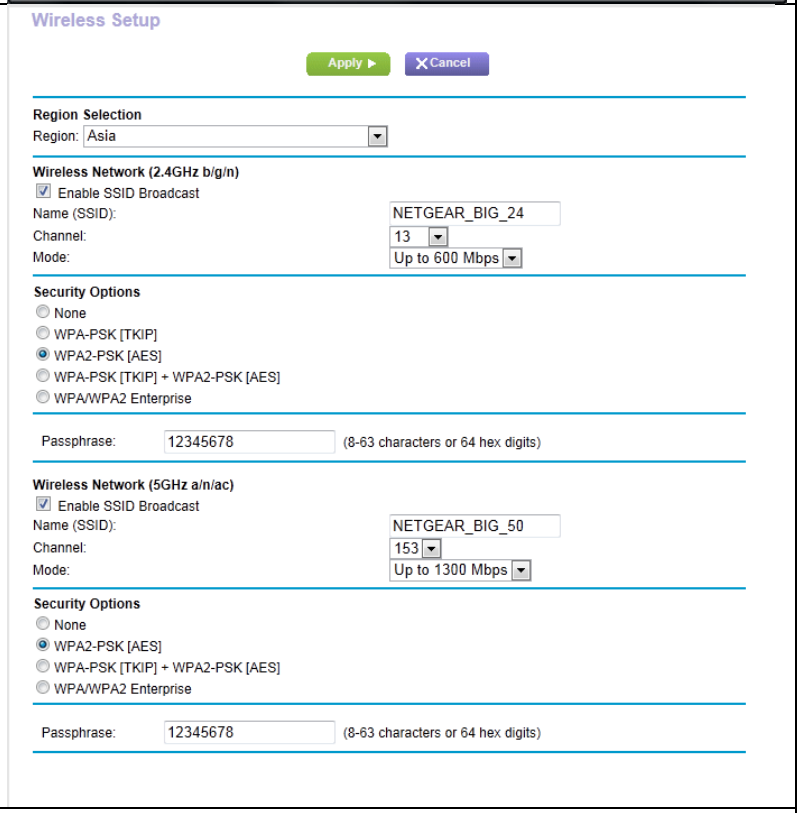
3.4.1.2 **Wireless Client Mode**

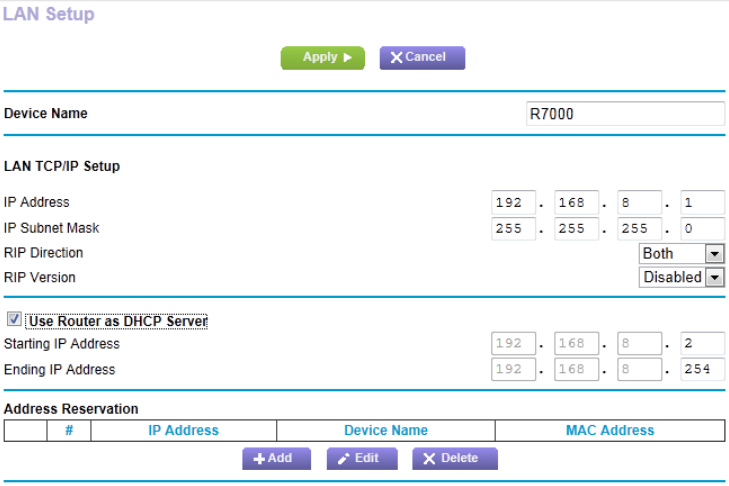
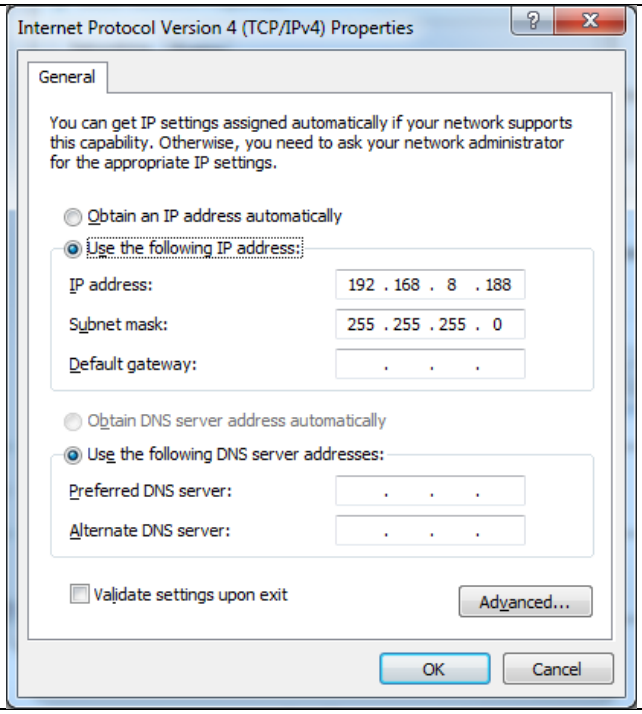
To complete Wireless Client mode configuration, user has to finish actions listed below.

Configuration of External wireless AP

Connect one end of Gigabit Ethernet Cable to Workstation, Connect another end to LAN port of External wireless AP	/
Open local network management interface	

Open local network configuration	
open IPV4 setting	
IP setting Network mask setting	Select “Obtain an IP address automatically”

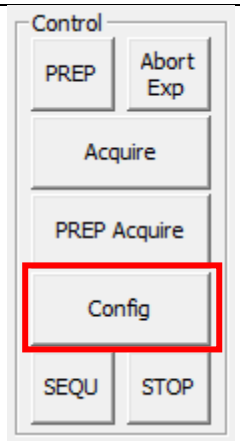
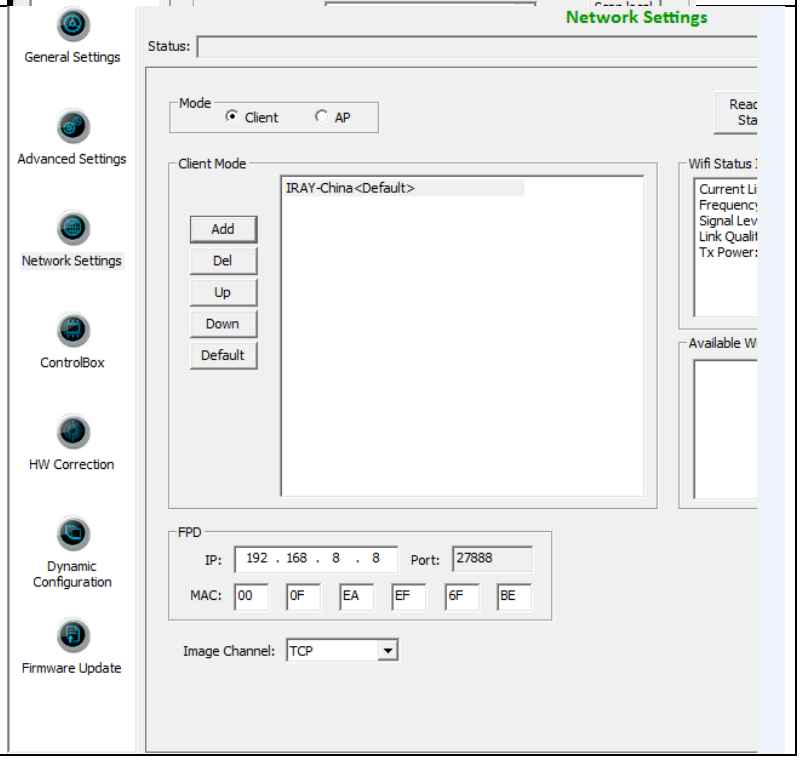
Open browser and type 192.168.1.1 Log into external wireless AP	
Wireless setup	
Configure 2.4GHz wireless network	SSID: NETGEAR_BIG_24 Security: WPA2-PSK Password: 12345678 Channel: [Please check the current Wi-Fi environment, and choose a relatively clean channel]
Configure 5GHz wireless network	SSID: NETGEAR_BIG_50 Security: WPA2-PSK

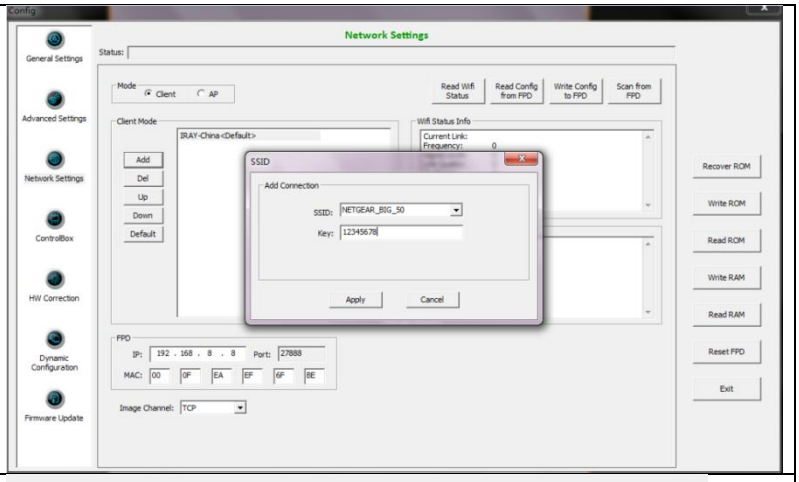
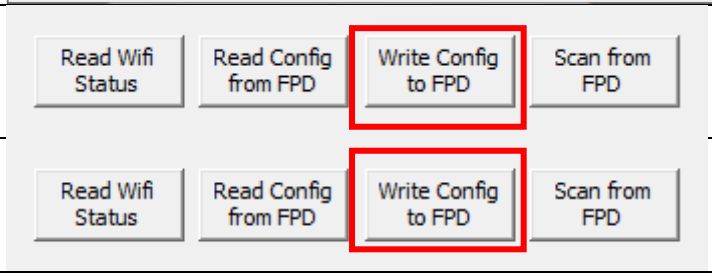
	Password: 12345678 Channel: [Please check the current Wi-Fi environment, and choose a relatively clean channel]
LAN setup	
Configure LAN IP address	IP address: 192.168.8.1 Subnet Mask: 255.255.255.0
External wireless AP reboot	Apply above settings and reboot your wireless router.
Recover local network IPv4 setting	
IP setting Network mask setting	IP address: 192.168.8.188 Subnet mask: 255.255.255.0

Configuration of detector

Either Wired Cable or Infrared device can be used to configure detector in wireless client mode.

a.To start configuration with wired cable. It is necessary to finish 3.4.1.1, then proceed to the steps below.

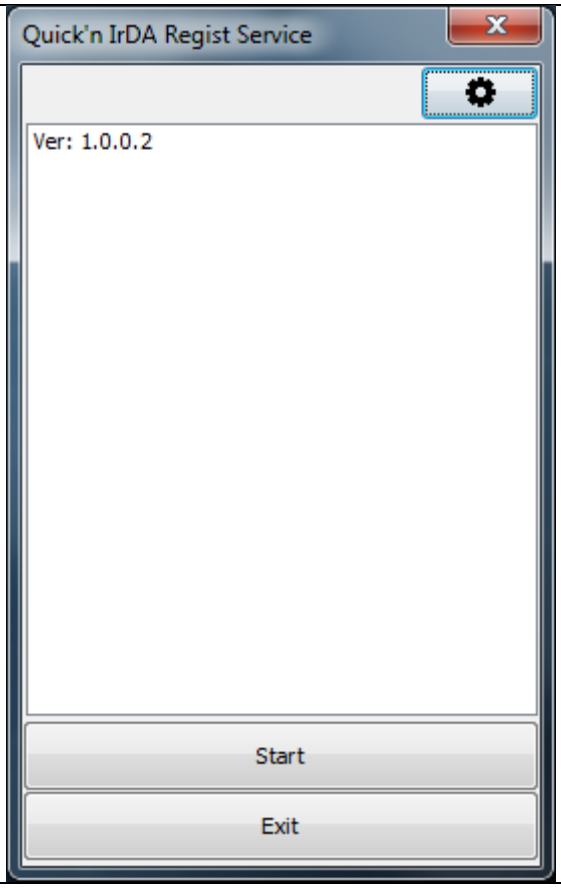
Click “Configure” in IDemo	
Click “Network setting”	
Click “Add”	

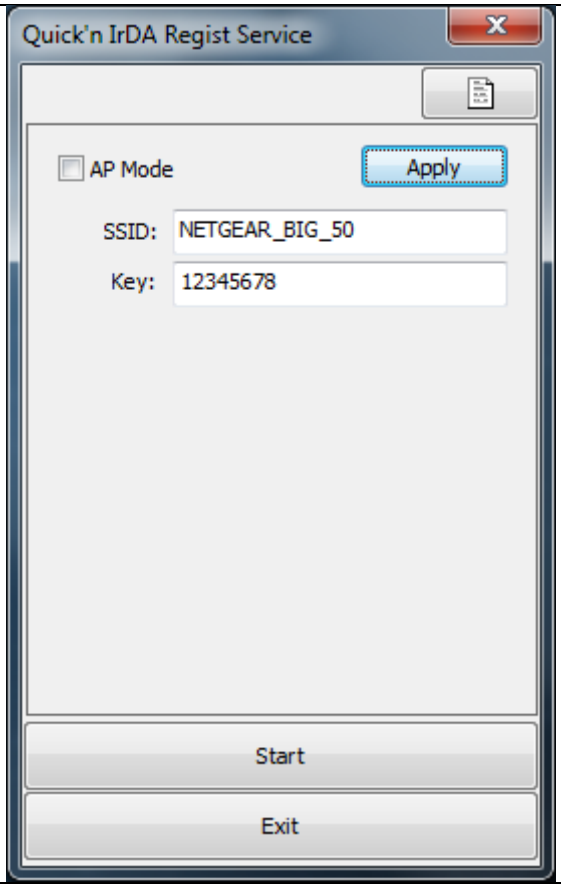
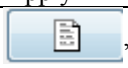
Change SSID and Key, Click “Apply”	
Click “write Config to FPD”	
Do not remove wired cable until “write to FPD” button recovers	

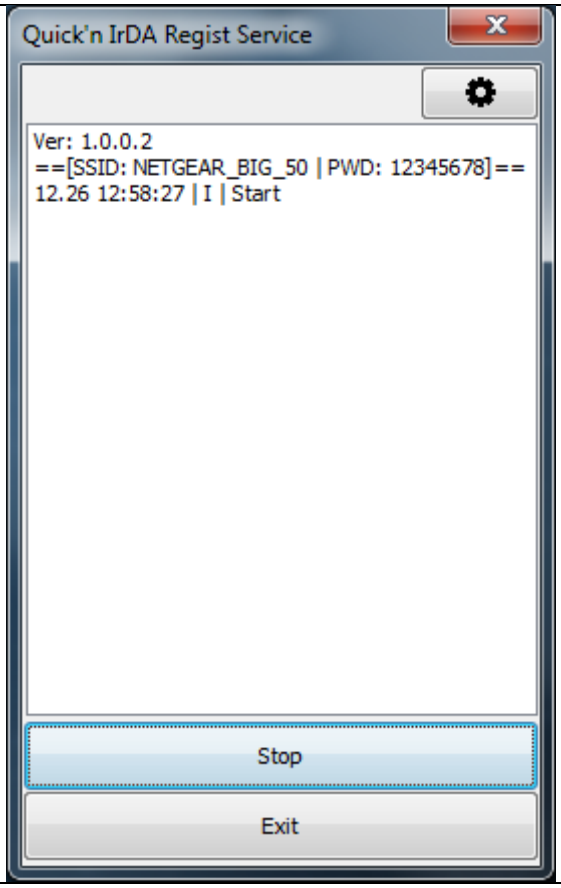
Since we have chosen default SSID and password, it would connect to wireless AP immediately after powered on next time.

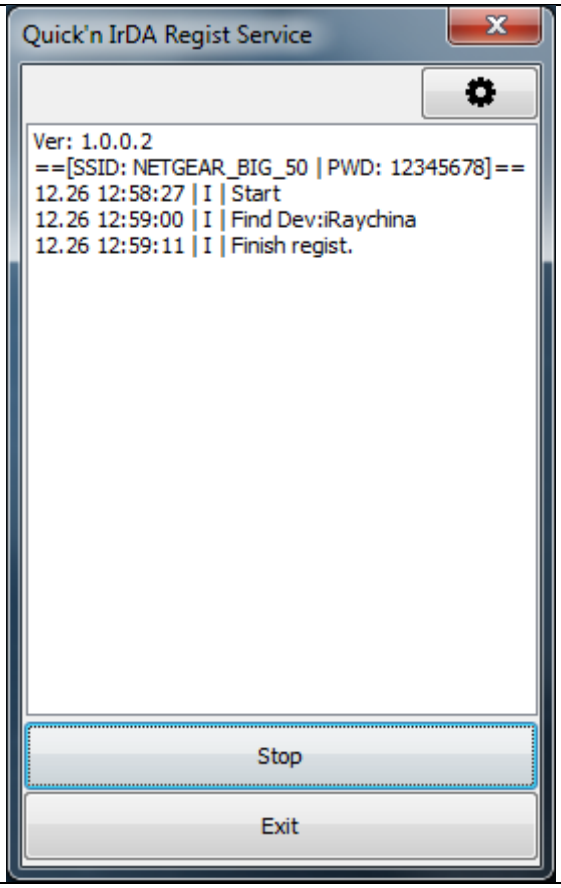
B. To start Infrared configuration. Please see below

Connect Infrared device with Workstation	/

Start IrDARegister.exe	
Click “ ” to open wifi setting	/

Change SSID and password, do not select AP mode	
Click “Apply”	/
Click”  ”	/

Click”Start”	
Point Infrared device to detector’s infrared interface	/

Do not click"Exit" until succeed	
Disconnect Infrared device from Workstation	/

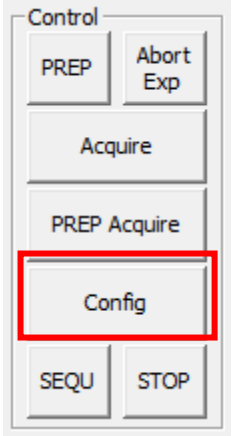
3.4.1.3 **Wireless AP Mode**

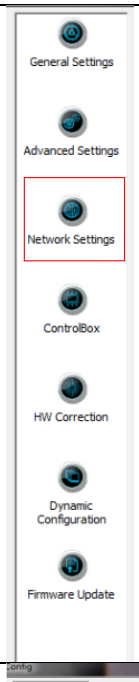
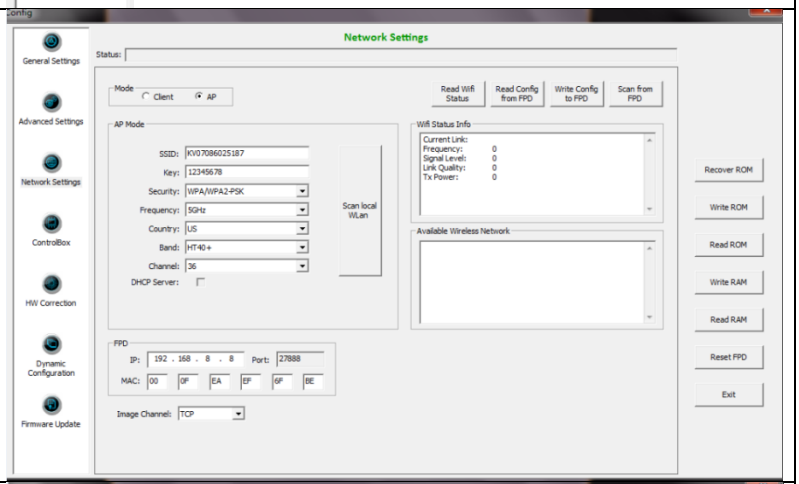
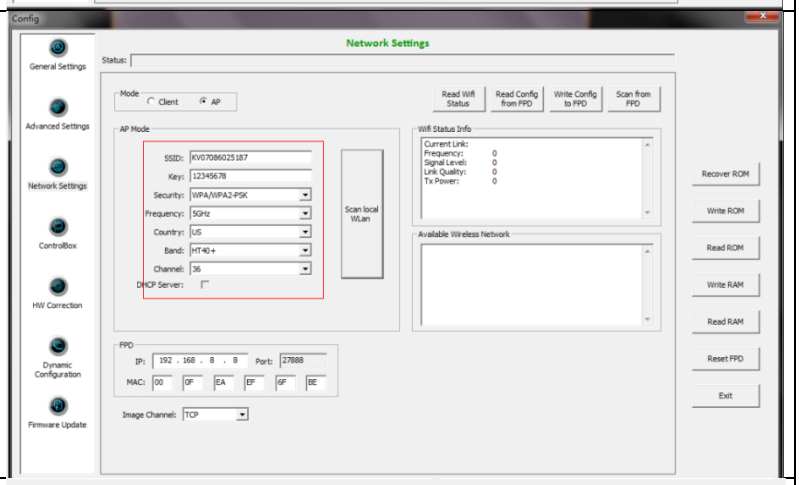
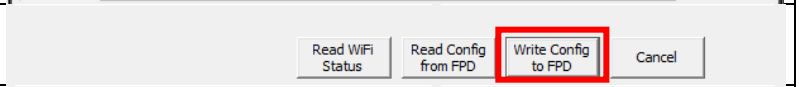
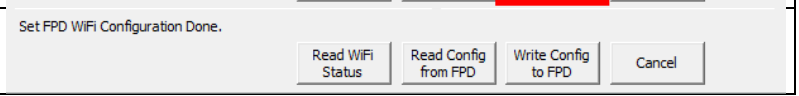
To complete Wired connection configuration, user has to finish actions listed below.

Configuration of detector

Either Wired cable or Infrared device can be used to configure panel wireless AP mode.

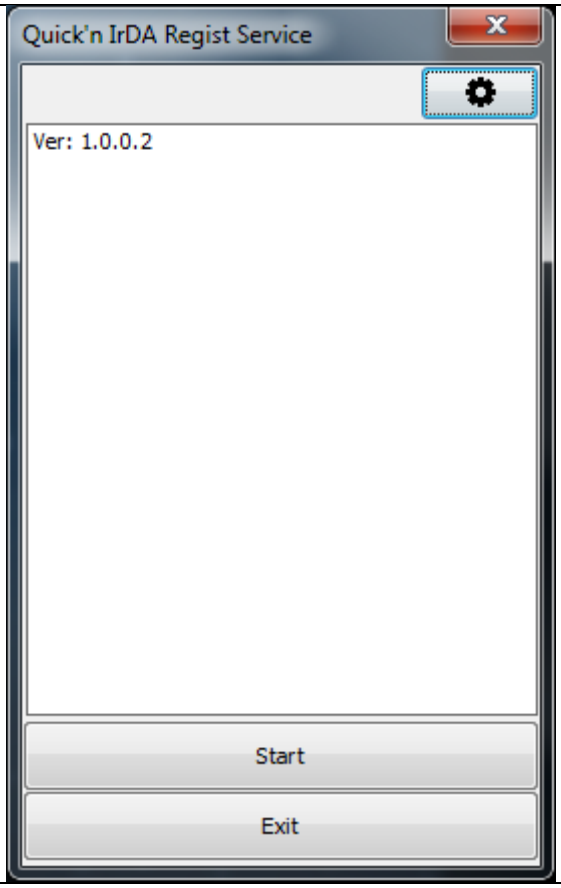
a.To start wired cable configuration, users should finish 3.4.1.1, then proceed to the steps below.

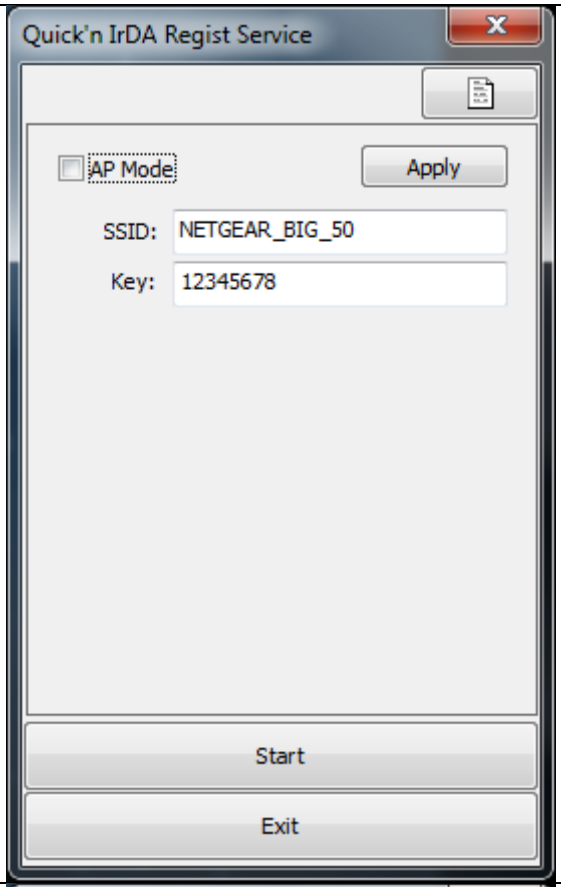
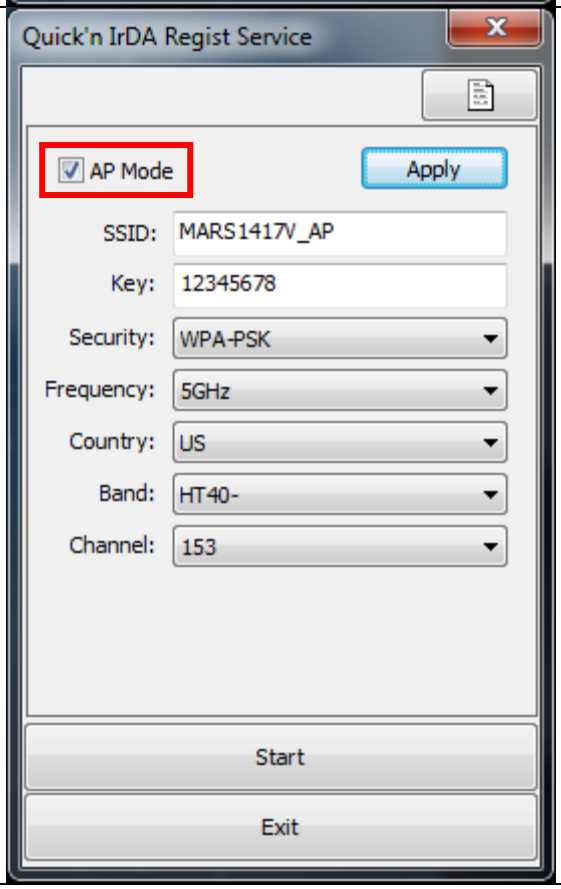
Click "Configure" in IDemo	

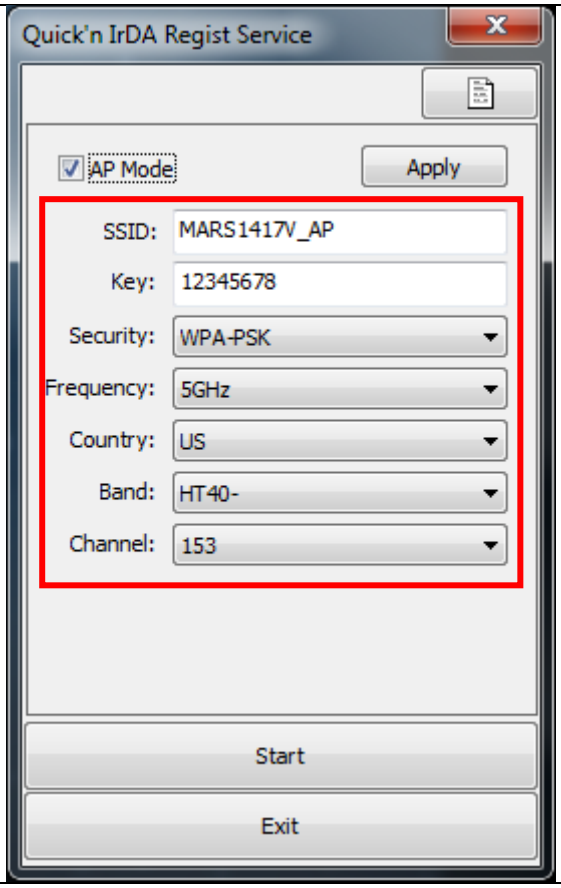
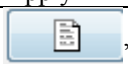
Click “Network setting”	
Select AP mode	
Change SSID and password setting , make sure SSID is different from other already exist;	
Click “write Config to FPD”	
Do not remove wired cable until “write to FPD” button recovers	

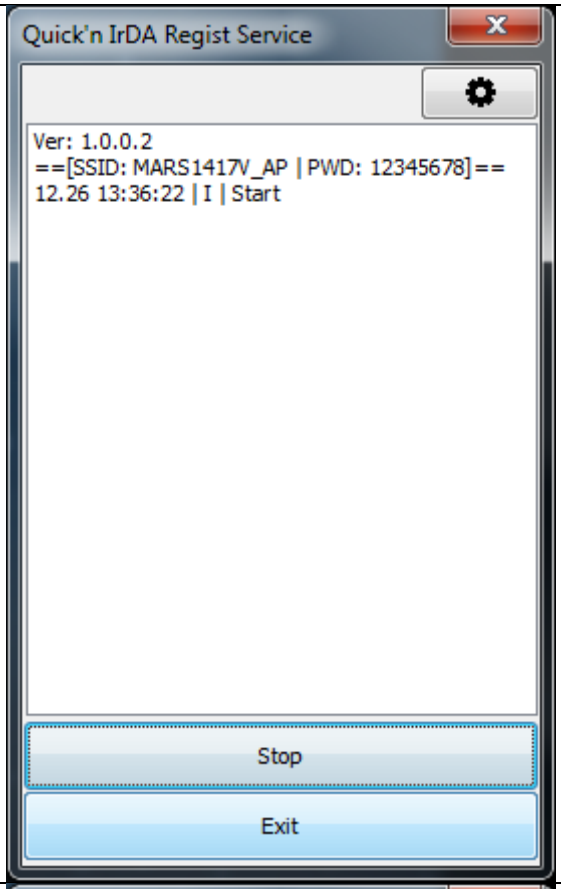
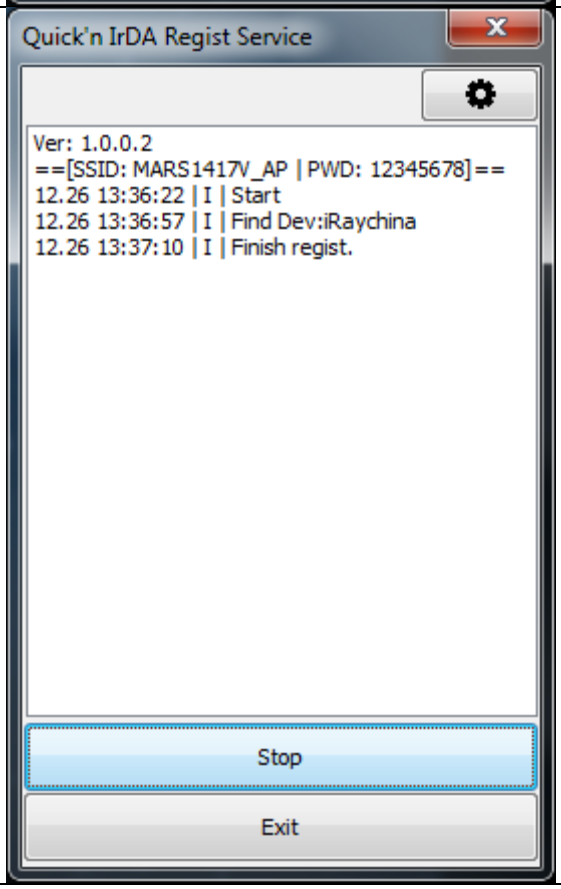
Since we have chosen default SSID and password, it would connect to wireless AP immediately after powered on next time.

b.To start Infrared configuration, please see below

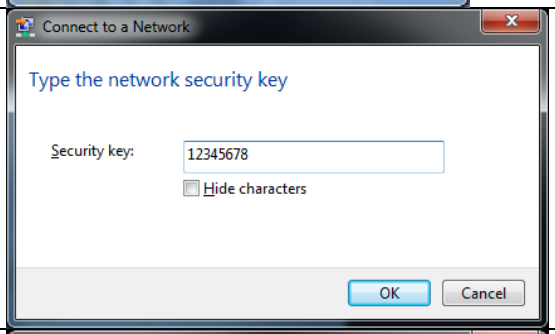
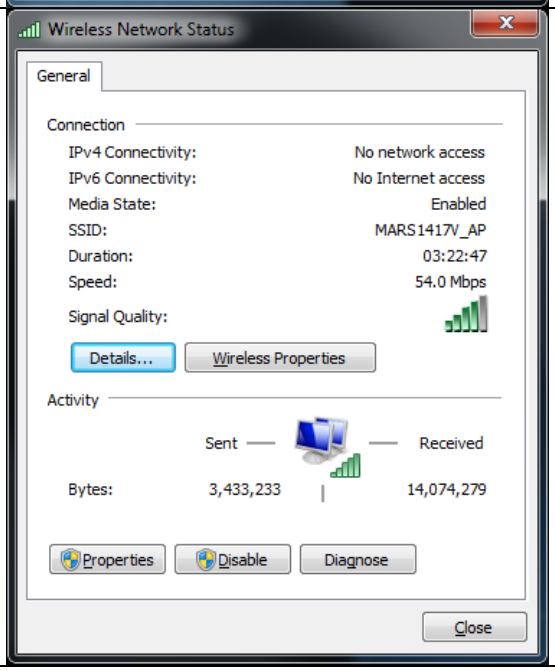
Connect Infrared device with Workstation	/	
Start IrDARegister.exe		

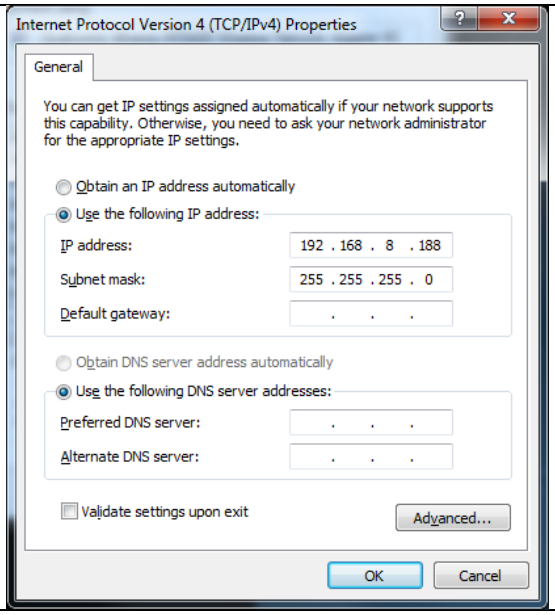
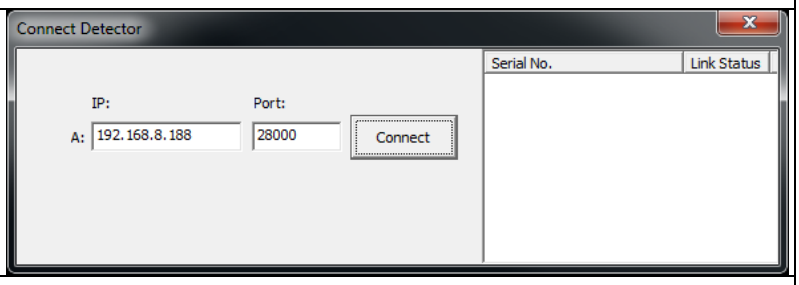
Click “ ” to open wifi setting		
Select “AP mode”		

Change SSID and password and other parameter, make sure SSID is different from other already exist;	
Click “Apply”	/
Click”  ”	/

Click”Start”		
Do not click”Exit” until succeed		

Configuration of external wireless card

Open local wireless signal list	
Select SSID which belongs to detectors; Input password and log into system	
Open wireless card configuration	

open IPV4 setting	
IP setting Network mask setting	IP address: 192.168.8.188 Subnet mask: 255.255.255.0
Open SDK and start connection	
IP and port setting	IP: 192.168.8.188 Port: 28000

4 Operation

Mars1417V provides SDK for user to integrate panel into their DR system. Additionally, it also provides an application for demonstration, i.e. Idemo. User can use Idemo to control panel without DR system.

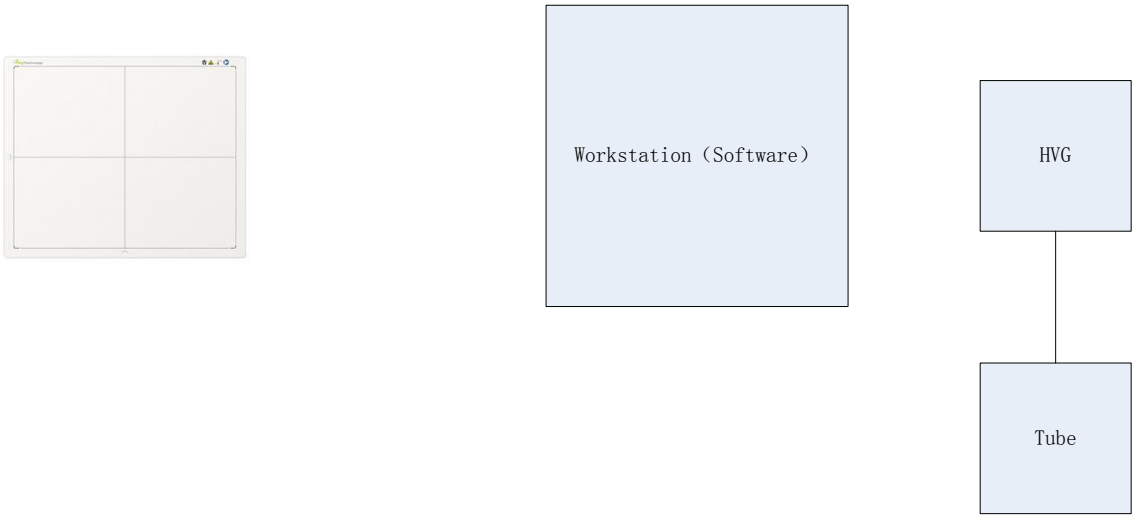
4.1 Main Operation

To Acquire X ray image is the main operation of Mars1417V. Most importantly, panel should build synchronization with with X ray generator.Mars1417V is born with three ways to acquire x ray image, that is Software Mode, Inner Mode and Isync Plus Mode.

4.1.1 Software Mode

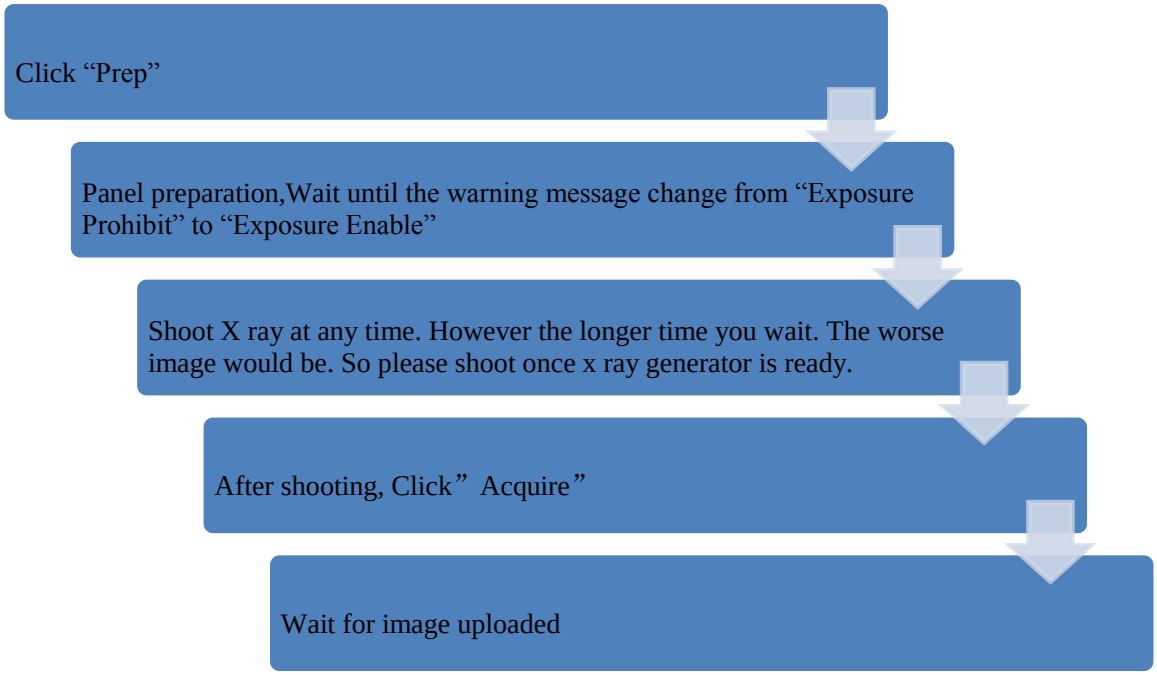
4.1.1.1 Block Diagram

Software mode is the basic way to acquire x ray image. Please see figure below for general feature



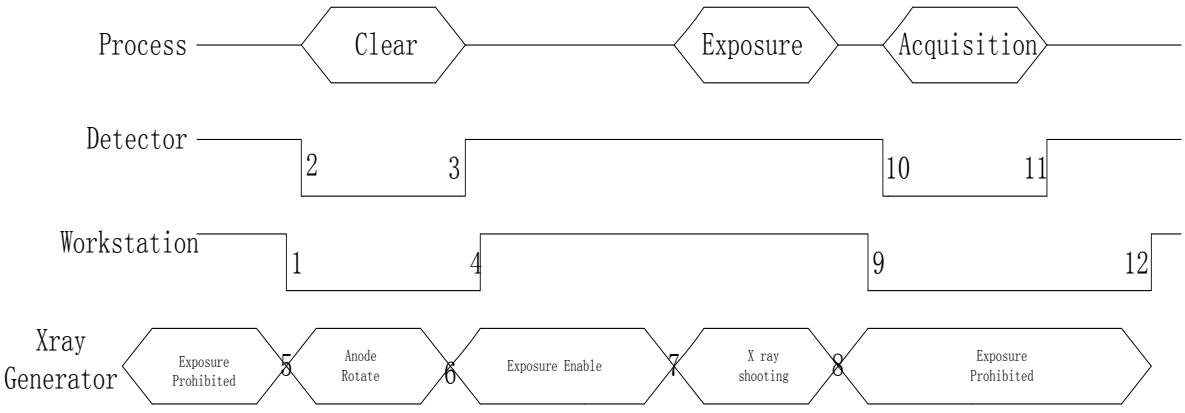
Workstation is a host device installed with idemo and SDK. Chapter 3 has described how to establish connection between panels and workstation. In software mode, workstation does not control x ray generator. Users would decide when to shoot x ray.

4.1.1.2 Work flow



4.1.1.3 Timing Setting

To set a clear scenario for programming, see diagram below for details



1. Workstation receives “prep” request, send command “Clear” to panel.

2. Panel receives “clear” from workstation, starts clearing leakage of panel. Meanwhile, panel send a message to workstation “Exposure Prohibited”.
3. Panel finishes “Clear” and send a message to workstation “Exposure Enable”.
4. Workstation shows “Exposure Enable” on the iDemo’s message bar to tell user shoot X ray now.
5. User triggers x ray generator to initialize and do anode rotation to prepare for X ray shooting.
6. X ray generator finishes preparation for X ray shooting and reminds user to shoot.
7. X ray generator starts releasing x ray
8. X ray generator finishes x ray shooting.
9. Workstation receives “Acquire” request, send command “Data Acquisition” to panel.
10. Panel receives “Data Acquisition” from workstation, start data acquisition operation.
11. Panel completes image acquisition and begins to send data to workstation.
12. Workstation receives all image data from panel.

If Hardware Pre-offset and Hardware Calibration is selected, image got is the final image.

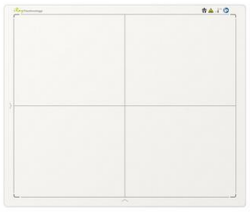
If Software Pre-offset and Software Calibration is selected, image got is the raw image, Workstation would finish image processing and show on screen.

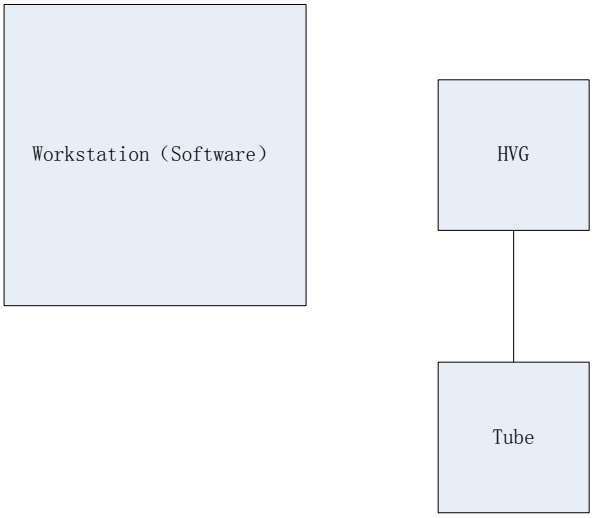
If Hardware Post offset and Hardware Calibration is selected, image got would be preview image (2x2 binning). After step12, panel would do another dark image acquisition. With both light and dark image, panel completes the correction and calibration process. Finally, panel uploads processed image to workstation.

If Software Post offset and Software Calibration is selected, image got would be preview image (No binning). After step12, Workstation sends another “clear Acquire” command to panel, panel finishes a dark image acquisition and uploads dark raw image to Workstation. With both light image and dark image, workstation completes the correction and calibration process. Finally, processed image shows on screen.

4.1.2 Inner Mode

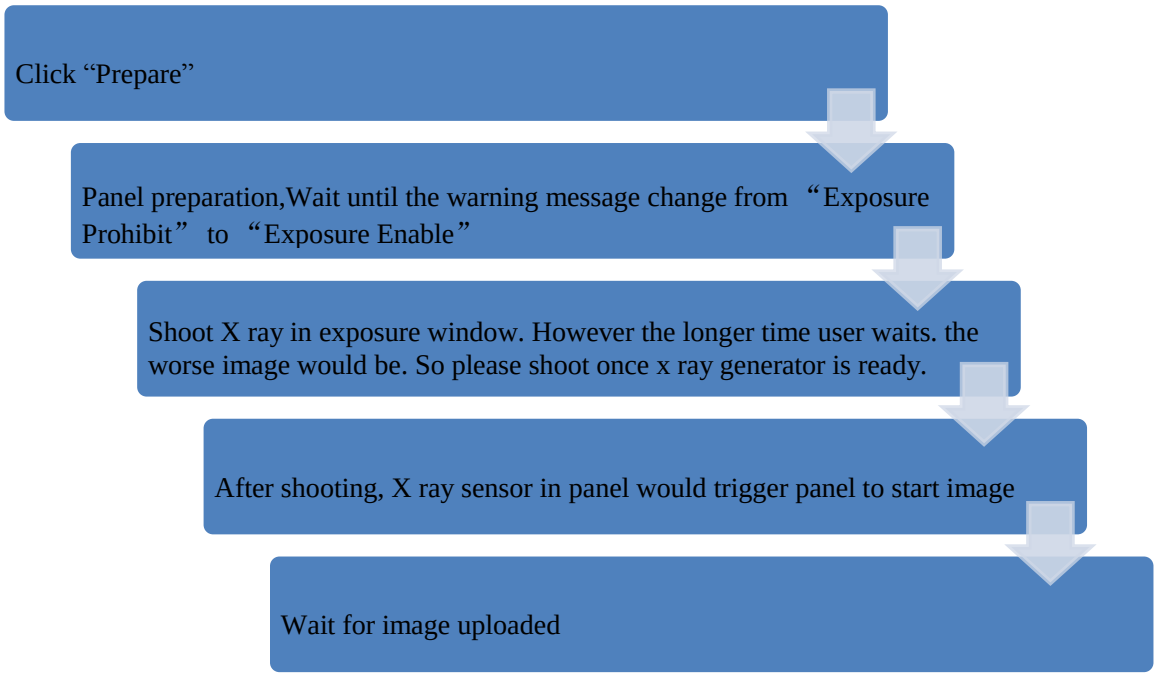
4.1.2.1 Block Diagram





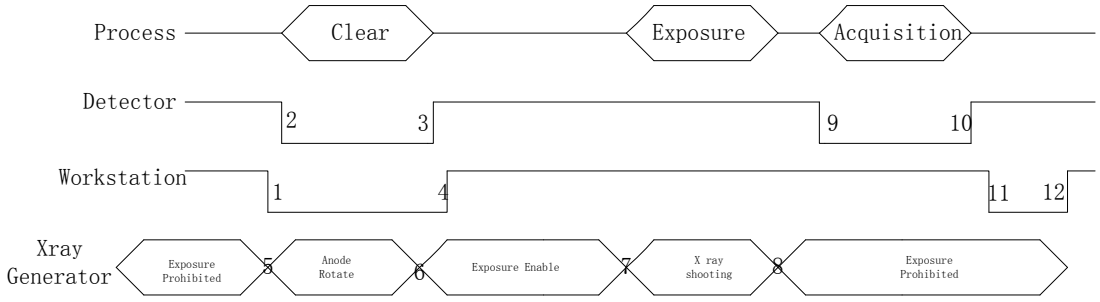
Workstation is a host PC device installed with iDemo and SDK. Chapter 3 has described how to establish connection between panels and workstation. In inner mode, workstation does not control x ray generator. Users would decide when to shoot x ray.

4.1.2.2 Work Flow



4.1.2.3 **Timing Setting**

To set a clear scenario for program, see diagram below for details



1. Workstation receives “prep” request and sends “Clear” to panels.

2. Panel receives “clear” from Workstation, start clear operation. Meanwhile, panel would send “Exposure Prohibited” to Workstation.

3.Panel finishes ”Clear” operation and send “Exposure Enable” to Workstation.

4.Workstation shows “Exposure Enable” on the iDemo’s message bar to tell user shoot X ray.

5.User triggers x ray generator to initialize and do anode rotation to prepare for X ray shooting

6.X-ray generator finishes preparation and reminds users.

7.X ray generator begins releasing x ray

8.X ray generator finishes x ray shooting.

9.X ray sensor in panel triggers panel to start image acquisition operation.

10.Panel completes image acquisition and begins to send data to Workstation.

11.Workstation starts receiving image data from panel.

12.Workstation receives all image data from panel.

If Hardware Pre-offset and Hardware calibration is selected, image got is the final image.

If Software Pre-offet and Software Calibration is selected, image got would be raw image, Workstation would finish image processing and image is shown on screen.

If Hardware Post offset and Hardware calibration is selected, image got from panel would be preview image (2x2 binning). After step12, panel would do another dark image acquisition. With both light and dark image, panel completes correction and calibration process. Finally, panel uploads processed image to Workstation and image is shown on screen.

If Software Post offset and Software calibration is selected, image got from panel would be preview image (No binning). After step12, Workstation sends another “clear Acquire” to panel , panel would do dark image acquisition and uploads dark image to Workstation. With both light and dark image, Workstation completes correction and calibration process. Finally, processed image is shown on screen.

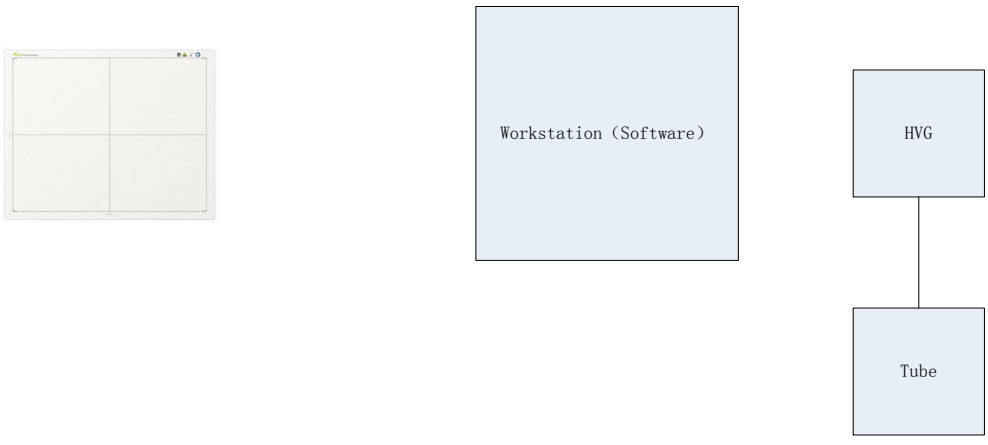
4.1.2.4 **Abnormal Action**

Action1: after Step4, if user wants to cancel X ray exposure cycle, Idemo provides an “Abort Exp” function to close exposure window. However, Idemo allows user to click “Abort Exp” until Workstation receives first image.

Action2: after Step4, if user does not shoot x ray in exposure windows, panel would close exposure windows automatically and send a message to Workstation that waiting for X ray shooting is overtime. Meanwhile, panel would also start image acquisition. After acquisition, panel sends image to Workstation.

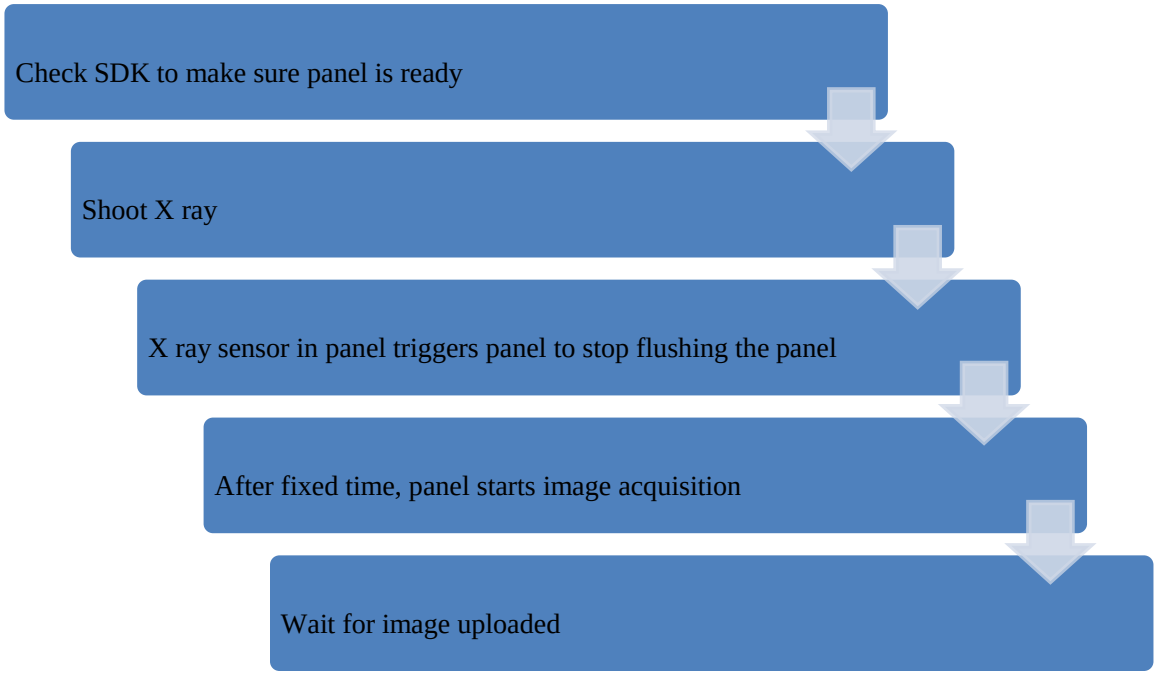
4.1.3 Isync Plus Mode

4.1.3.1 **Block Diagram**

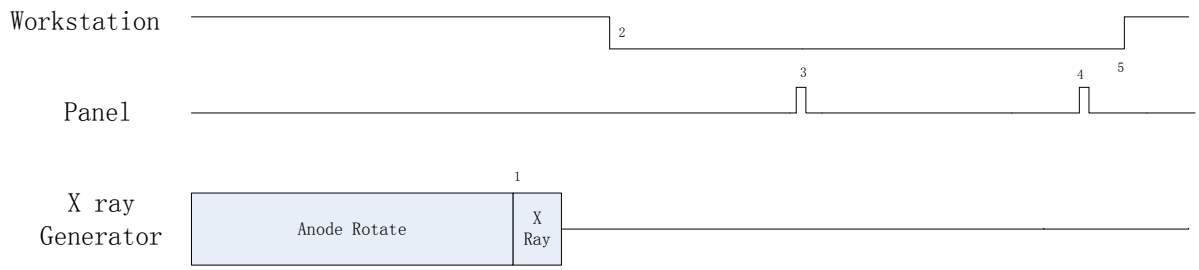


Workstation is a host PC device installed with iDemo and SDK. Chapter 3 has described how to establish connection between panel and Workstation. In Isync Plus mode, User doesn’t interact with Workstation. After shooting, images would be shown on screen immediately.

4.1.3.2 Work Flow



4.1.3.3 Timing Setting



1. X ray generator is ready for X ray shooting and begins to release X ray.

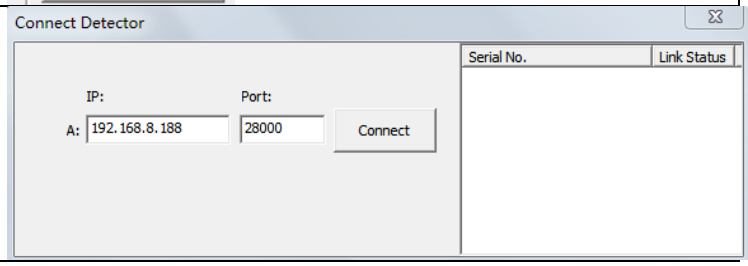
2. Workstation receives “Exposure Prohibited” from Panel.

3. Panel starts uploading Pre-dark image and Light image to Workstation for preview. If hardware offset is selected, panel would do offset first, and then upload preview image (2X2 binning).

4. Panel starts uploading Post-dark image to Workstation. If hardware offset is chosen, panel would do correction and calibration first, then upload processed image to Workstation.

5. Workstation receives “Exposure Enable” from Panel.

4.2 Connection Build

Click “Start”	
Input IP address and port number. The IP address should be the same as the IP address of the network card connected with panel. The port should use the default value of 28000; Click “Connect”;	

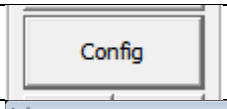
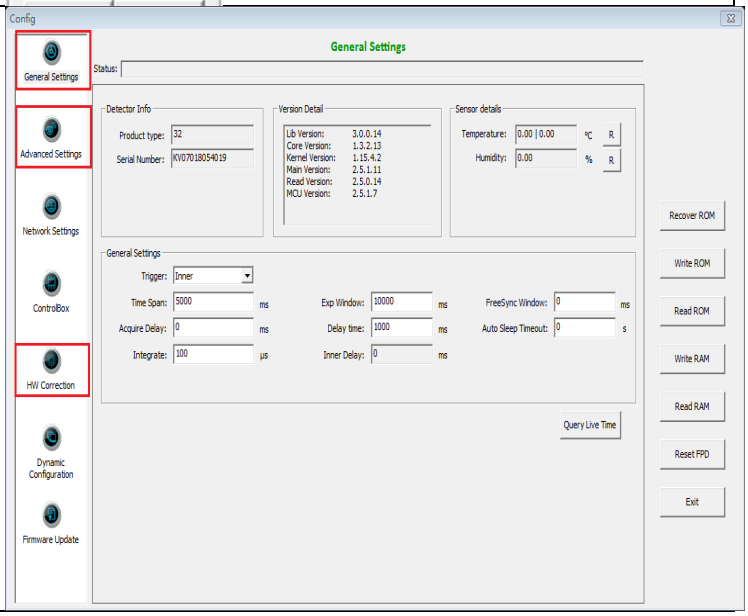
Note:

1. Once changing connection from different network card, user must re-connect panel with different IP address.

2. Switching between wired and wireless connection does not need any extra operation.

3. The rule of Multi-Share control is based on IP address. The second terminal with different IP address is not allowed to operate panel after the first one connected. If there is no command transmission between panel and Workstation over 5 minutes, panel releases access authority.

4.3 Panel Configuration

Click “Config”	
Set parameters	

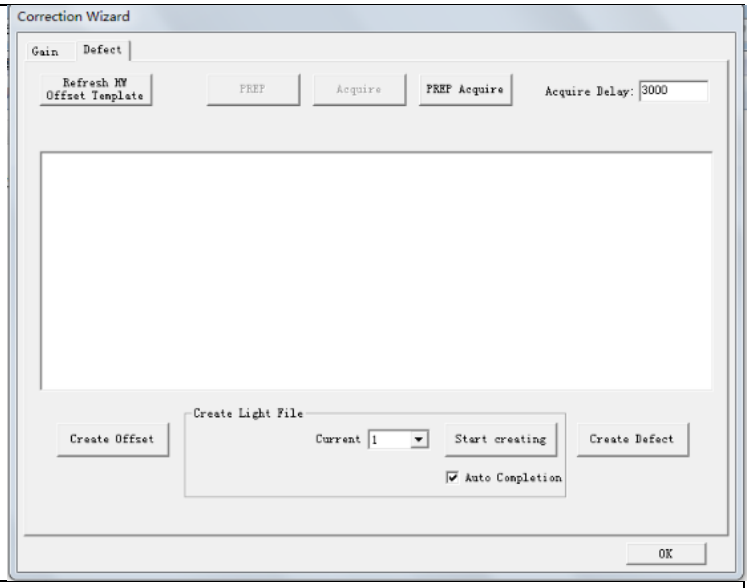
Note: 1. If panel works in Isync Plus mode, it is not allowed to change any parameters and write into ROM or RAM. User is required to switch to software mode, change parameters and then switch to Isync Plus mode. On the other hand, we do not recommend user to switch working mode too often.

4.4 Correction and Calibration Template Generation

Iray recommends performing correction and calibration after installation or any major change on the system settings and hardware configuration. On the other hand, it is also recommended to do the correction and calibration in each 6 months.

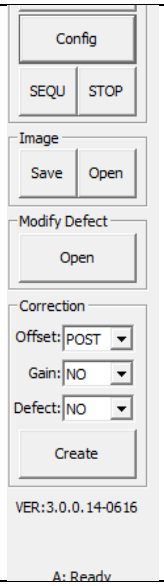
4.4.1 Pre-offset Template Generation

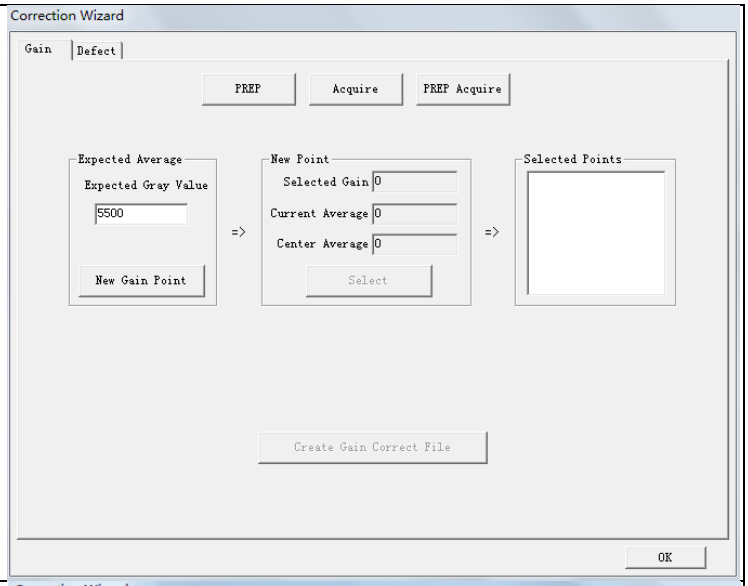
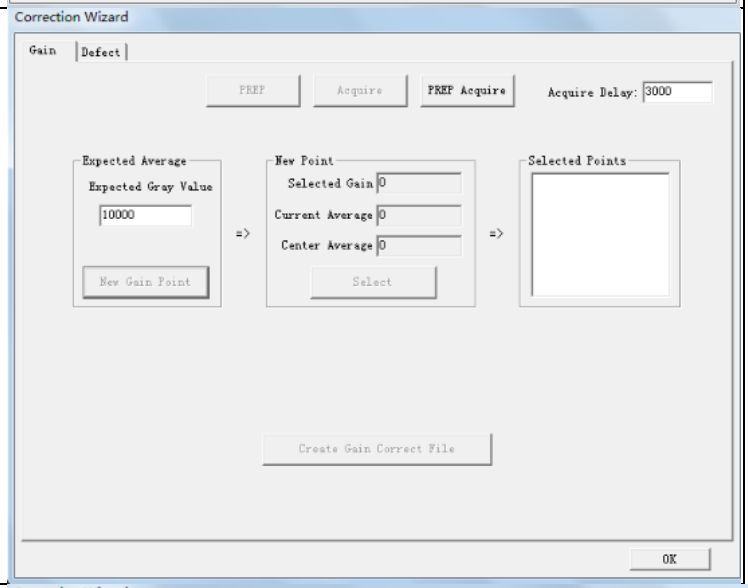
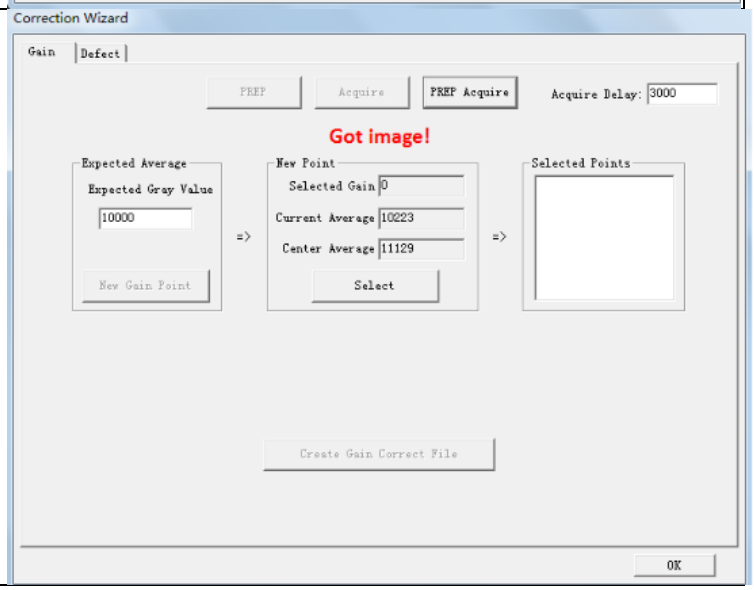
If panel is configured to do Pre-offset correction, Pre-offset Template is necessary. See below

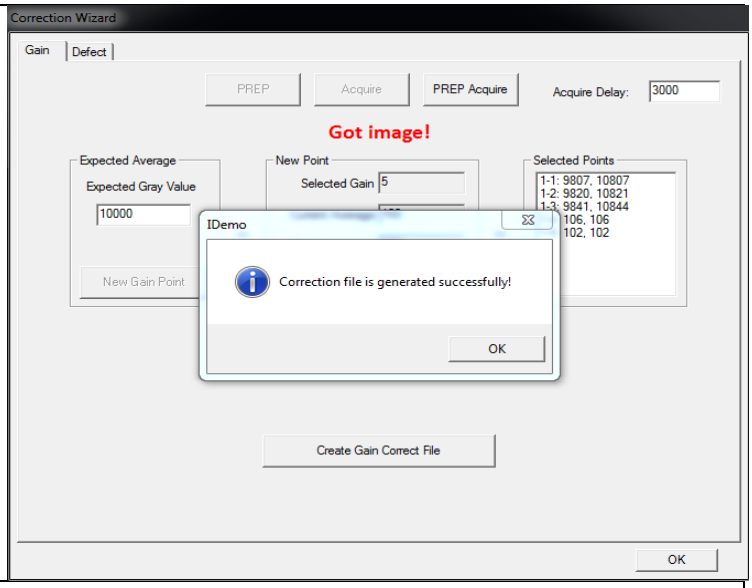
Click “ Create”, Choose “Defect”	
Click “Create Offset”, wait until image acquisition ends	/

4.4.2 Gain Calibration Template Generation

Before Gain template generating, make sure SID1.2m, no copper is required,

Choose “Post” offset mode[1]	

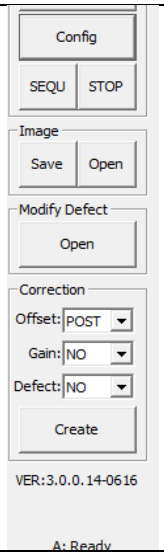
Click “ Create”, Choose “Gain”	
Set “Expected Gray Value” 10000; Click “New Gain Point”; Set “Acquire Delay” 3000; If panel is in software mode, click “Prep” ,shoot X ray, click “Acquire”; If panel is in Inner mode, click “Prep”, shoot X ray; If panel is in Isync Plus mode, click “Prep Acquire”, wait for ready, shoot X ray. Time window can be set by “Acquire Delay”;	
Wait for Post-offset image uploaded, there will be value shown in “current average” box, change X ray dose to make sure “current average” in the range of 10000±100, If yes, Click “Select”	

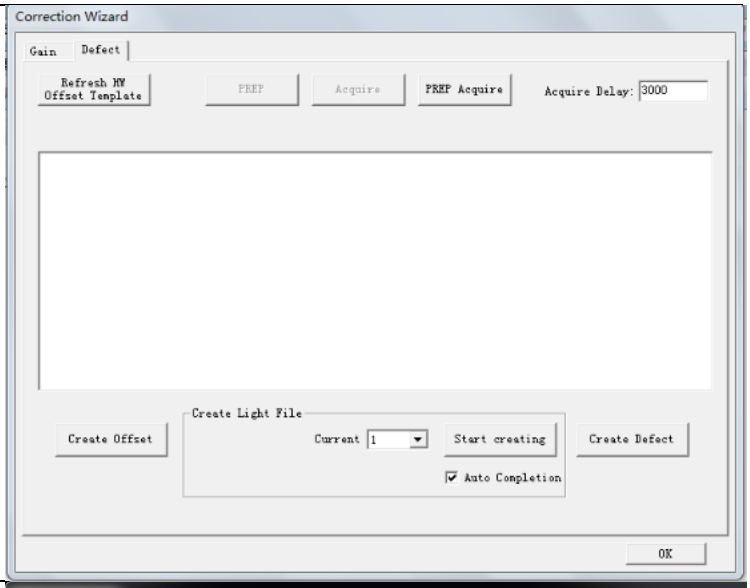
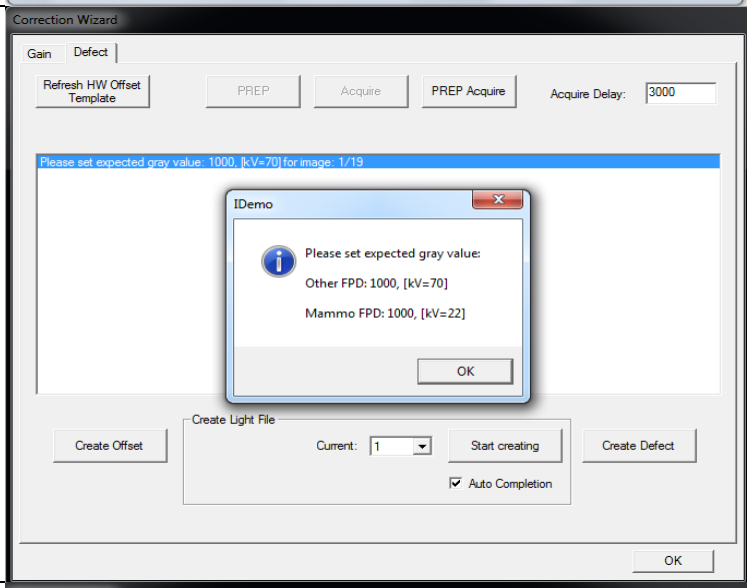
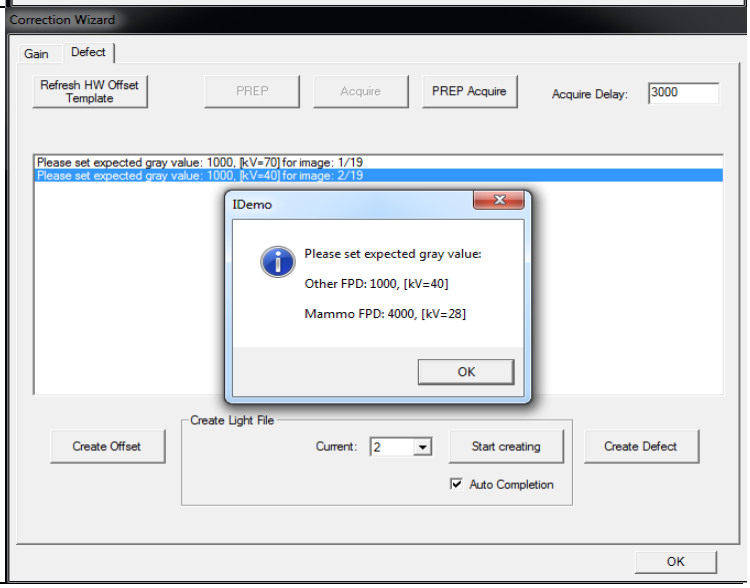
Repeat the same operation for 4 times, “Create Gain Correct file” button can be available, Click “Create Gain Correct file”	
Click “OK”	/

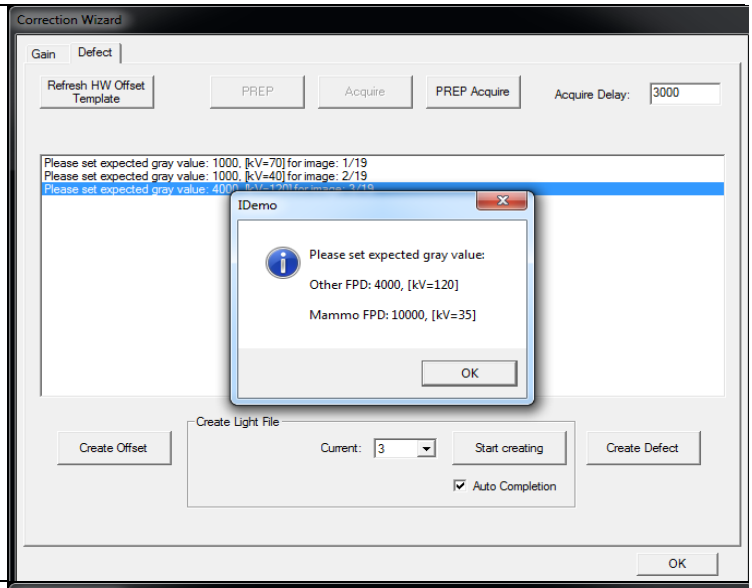
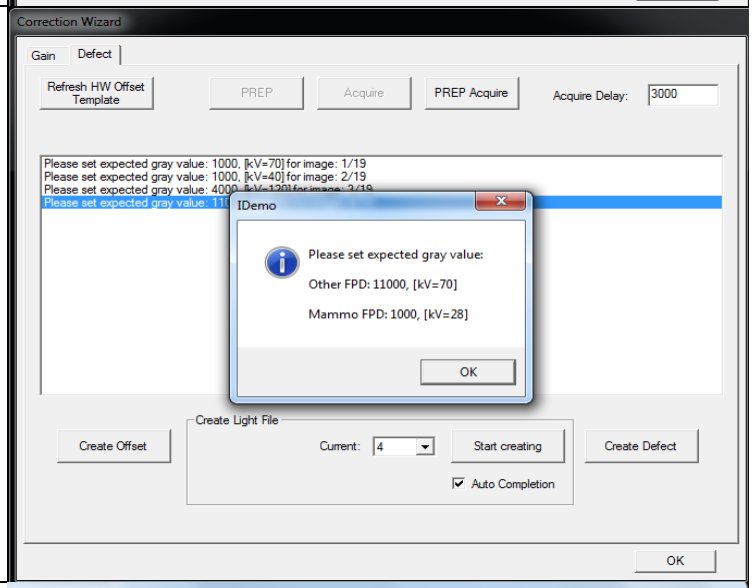
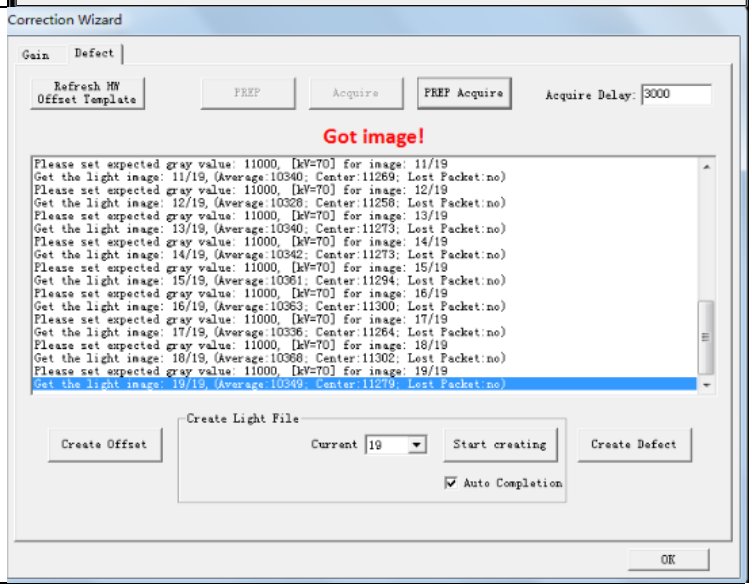
Note:1 please use software post offset correction.

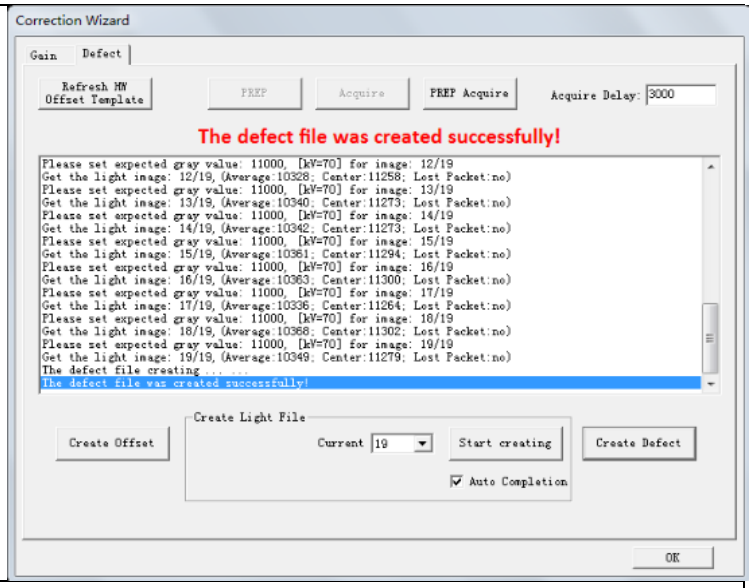
4.4.3 Defect Correction Template Generation

Before Defect template generating, make sure SID1.2m, no copper is required,

Choose “Post” offset mode[1]	

Click “ Create”, Choose “Defect”	
Click “start creating”, message box will show you the first image value for defect correction[2]; If panel is in software mode, click “Prep” ,shoot X ray, click “Acquire”; If panel is in Inner mode, click “Prep”, shoot X ray; If panel is in Isync Plus mode, click “Prep Aquire”, wait for ready, shoot X ray. Time window can be set by “Acquire Delay”;	
Click “start creating” to start the second x ray shoot	

Click “start creating” to start the third x ray shoot	
Click “start creating” to start the fourth x ray shoot	
After the fourth x ray shoot, you do not need to change the x ray dose, just repeat operation of “start creating” and image acquisition until it comes to the 19th images.	

Click “Create Defect”, wait until it ends	

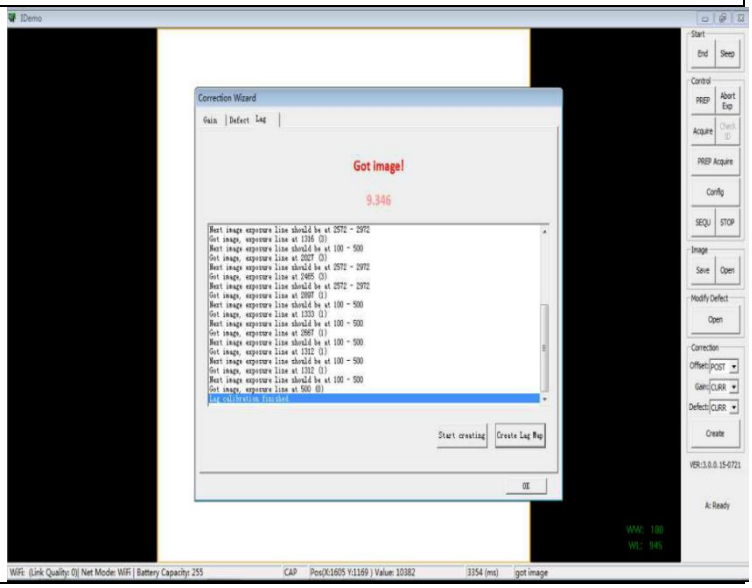
Note:1 please use software post offset mode.

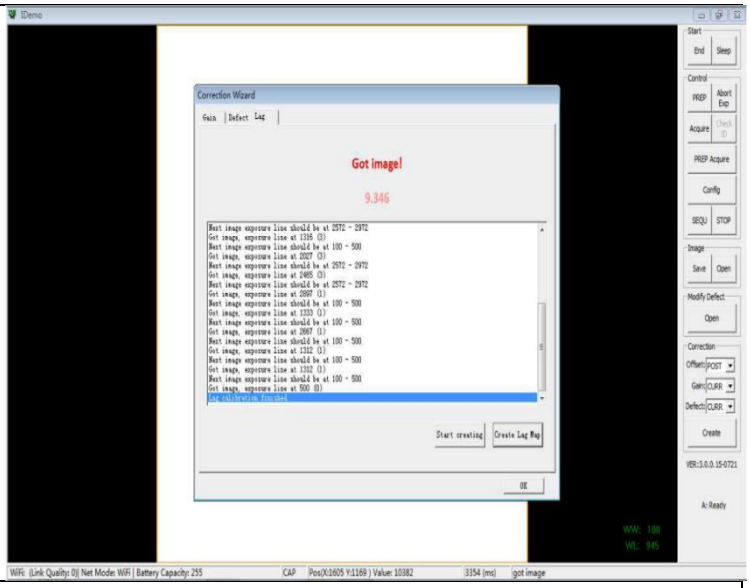
2. Make sure your x ray dose is right, if your dose is out of the range, idemo will remind you to adjust the dose. Then you can click “start creating” and try again.

3. If users operate with two panels, SDK has a probability of quit automatically.

4.4.4 Lag Template Generation

Lag template is only used in Isync plus mode, if panel works in other mode, user does not have to complete lag template. Before Lag template generating, make sure SID 1.2m, no copper is required.

Choose “Post” offset mode Choose “curr” gain mode Choose “curr” defect mode	/
Click “Create” Choose “Lag” correction Click “Start creating”	

Change X ray dose to make sure average gray value in the range of 10000±100, Shoot X ray, Post-offset image is shown on screen, make sure exposure line between 50 and 500. If not, repeat the operation until the requirement is satisfied; Shoot X ray, another Post-offset image is shown on screen, make sure exposure line between 2300 and 2750. If not, repeat the operation until the requirement is satisfied; Click “Create Lag Map”;	
Close correction window until “lag calibration finished” shows on screen;	/

4.5 Image Acquisition Continually

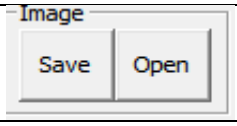
Image Acquisition continually can be used only in software mode and inner mode, it is not supported in Isync Plus mode. The operation is designed for panel testing, not for customer using.

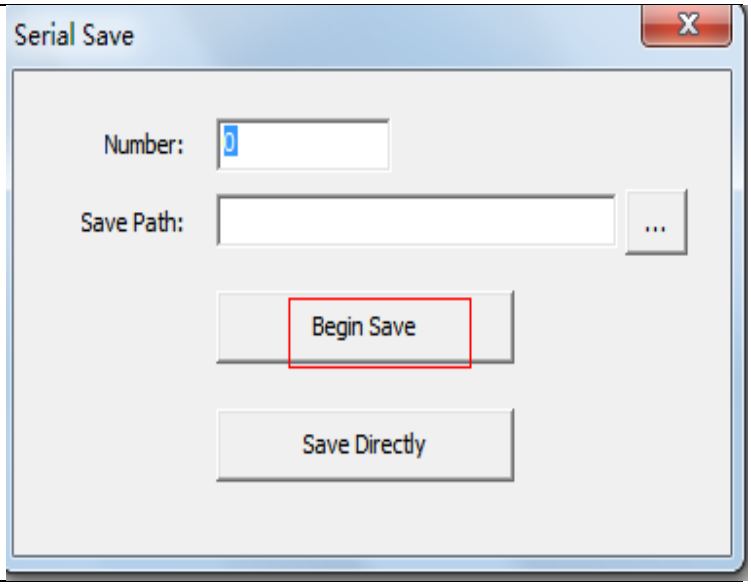
“SEQU” is the command to start image acquisition and “STOP” is the opposite. If user wants to change frequency of image acquisition, change parameters in “Config-General Setting-Time Span”.

4.6 Image save

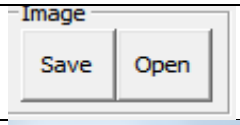
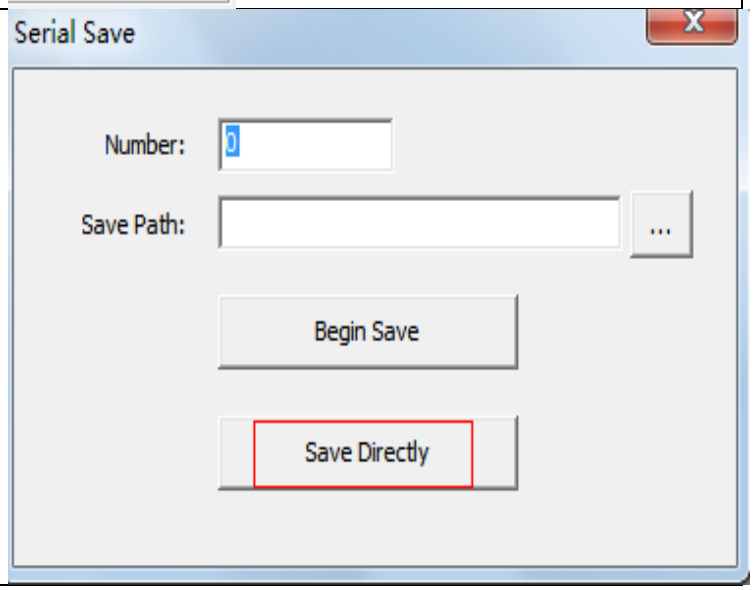
“SAVE” provides two features of image saving for user. The first is saving multiple images, the second is saving single image.

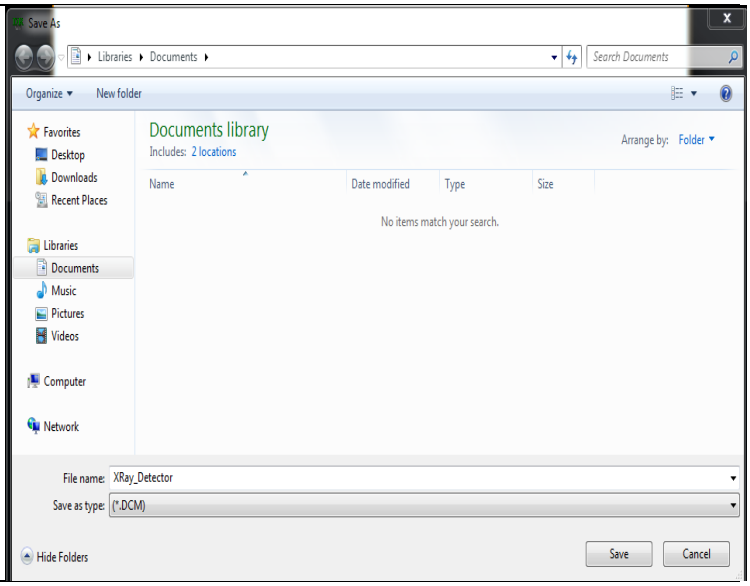
4.6.1 Multiple images

Click “Save”	

Set the number of images in blank; Choose the saving path; Click “Begin Save”;	

4.6.2 Single image

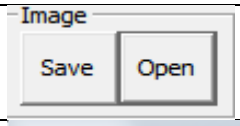
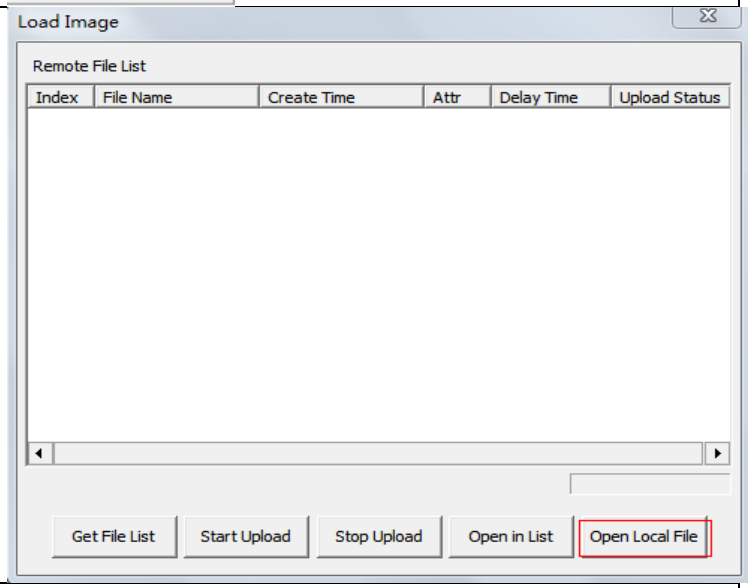
Click “Save”	
Click “Save Directly”	

Choose the saving path; Click “save”;	

4.7 Image Check and upload

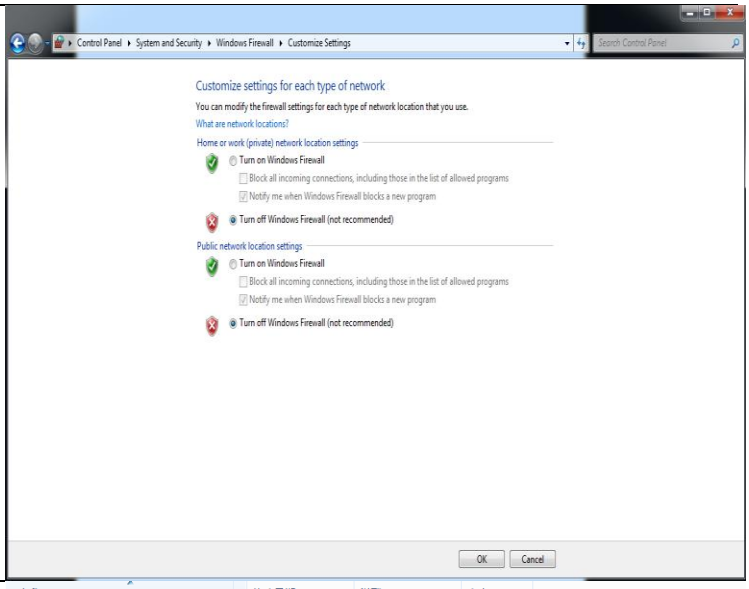
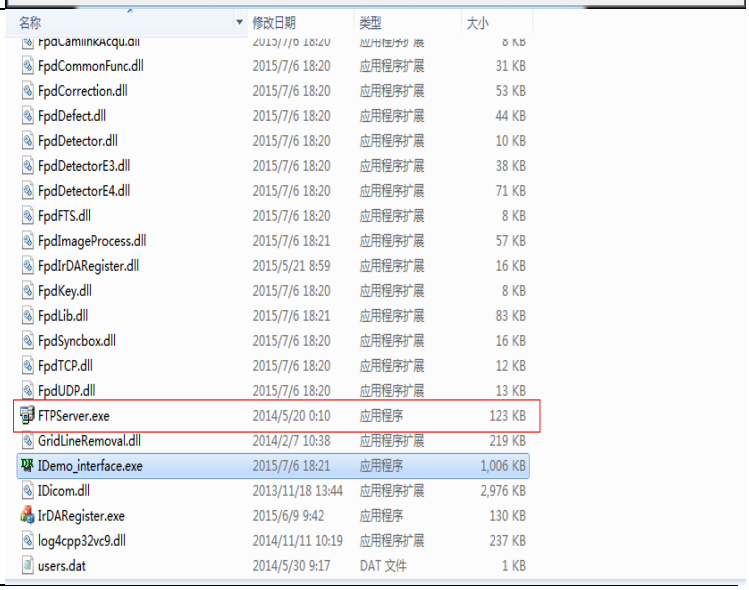
“OPEN” provides three feature for image check and uploading. Local Image Check, Panel Image Upload and Panel Image Check. Local Image Check defines function to check image saved in Workstation. Panel Image Upload defines function to upload images stored in panel. Panel Image Check defines function to check images stored in panel.

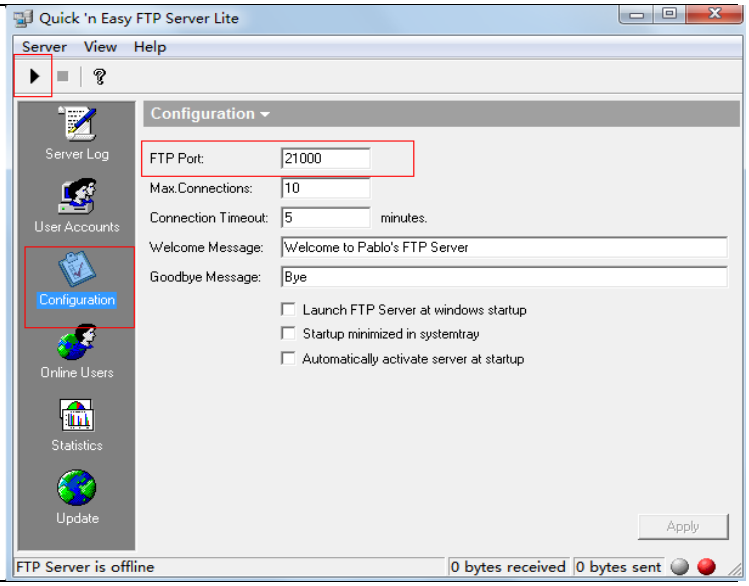
4.7.1 Local Image Check

Click “Open”	
Click “Open Local File”	
Choose images stored in Workstation, images would be shown on screen	/

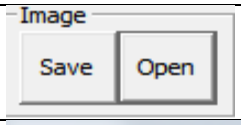
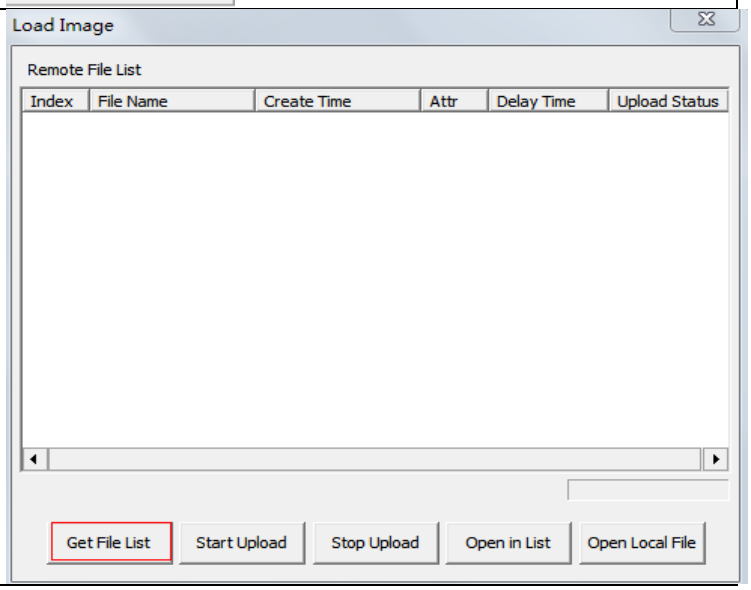
4.7.2 Panel Image Upload

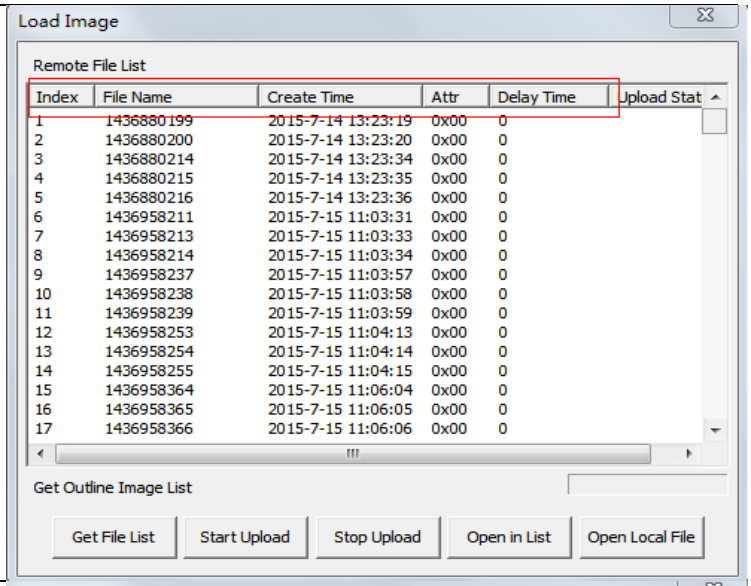
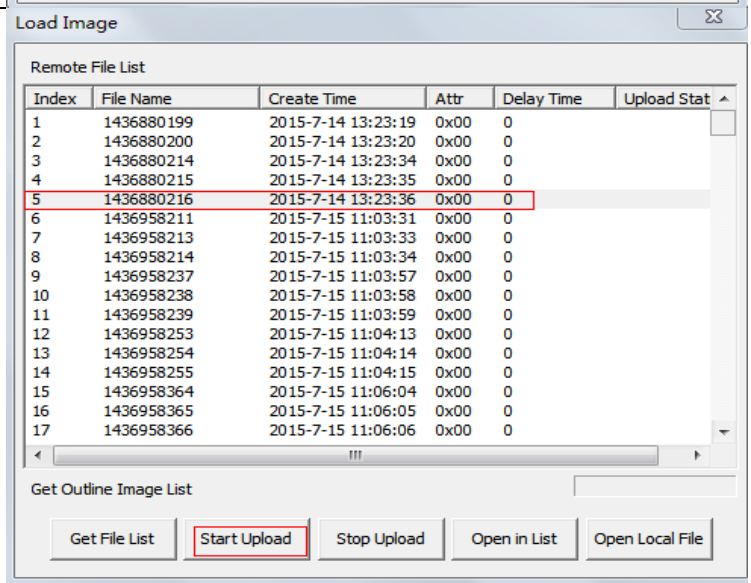
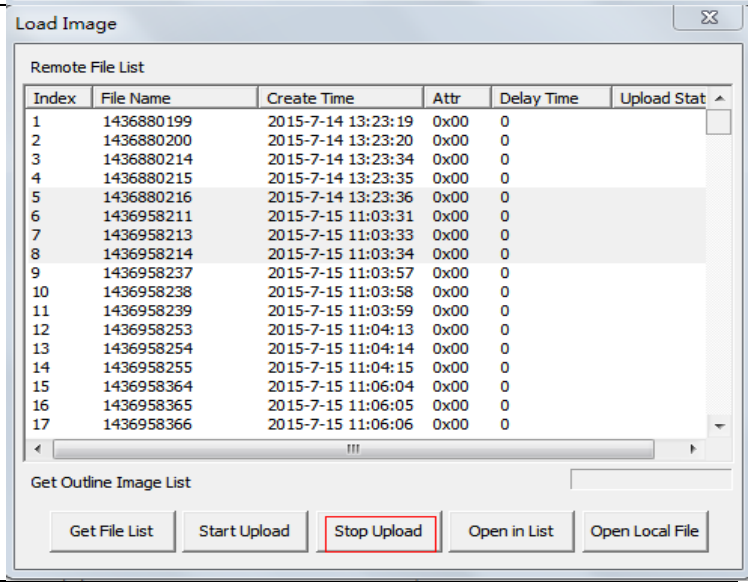
Before panel image uploading, FTP server is necessary.

Make sure firewall is closed	
Start “FTPServer.exe”	

Choose “Configuration”; Set FTP Port “21000”; Click “Start” button;	

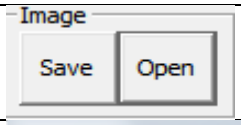
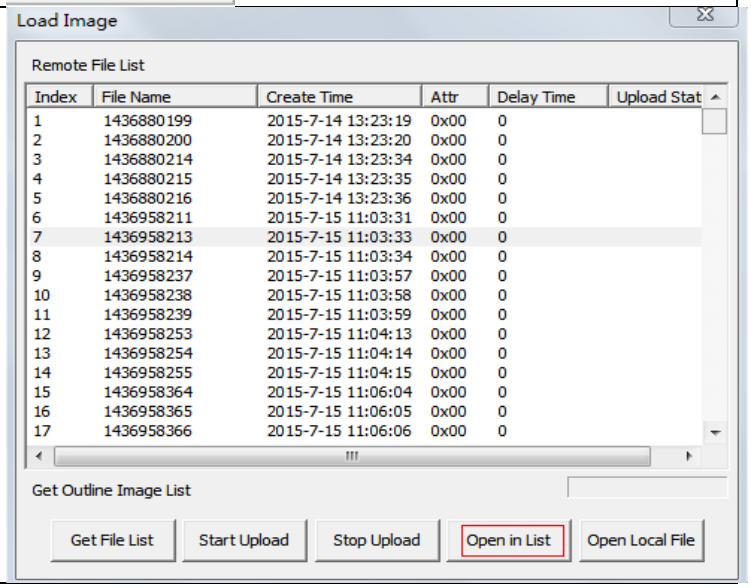
Panel Image is uploaded as following.

Click “Open”	
Click “Get File List”	

Images stored in panel would be shown in the list. From the list, user could check basic information of images	
Select images user wants; Click “Start Upload”; Images would be uploaded to */idemo/upload	
If user want to upload multiple images, select multiple images, click “start upload”, during uploading, user could click “stop upload” to stop uploading	

4.7.3 Panel Image Check

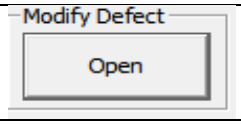
If user wants to check images stored in panel immediately, see below

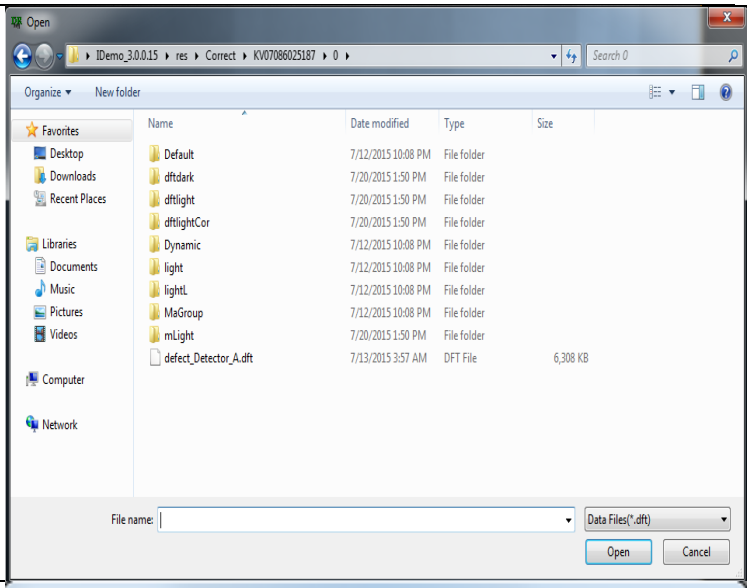
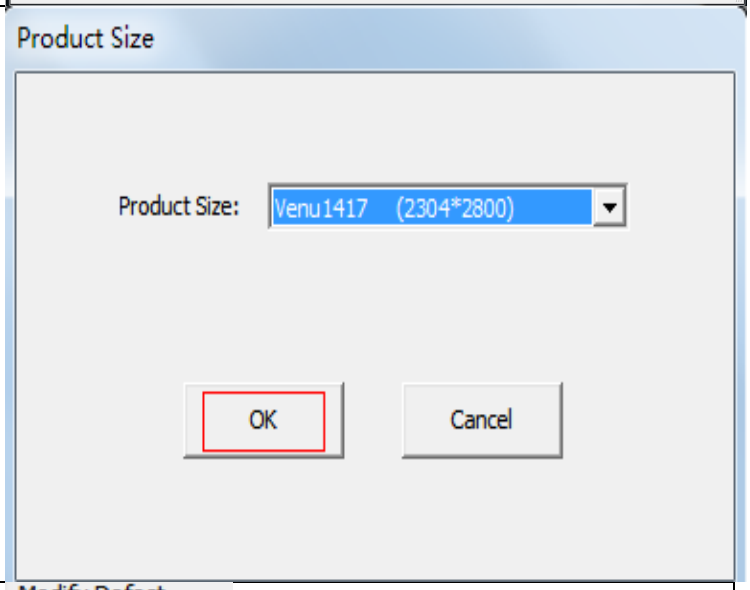
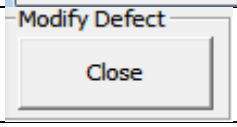
Click “Open”	
Select image user need; Click “open in list”	

4.8 Defect Template Check and Modification

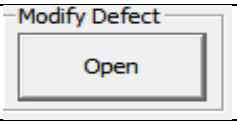
Idemo provides function to check defect template. If defect template has updates, user could add and delete defect pixel or defect lines by modifying defect template opened.

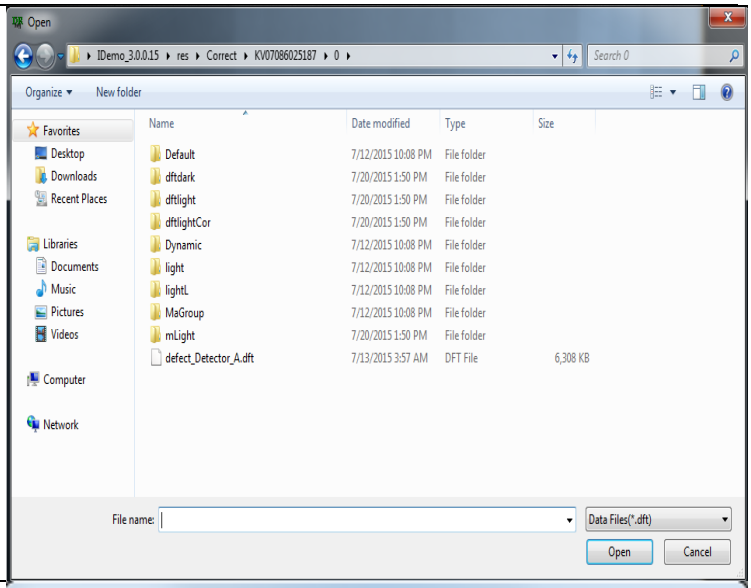
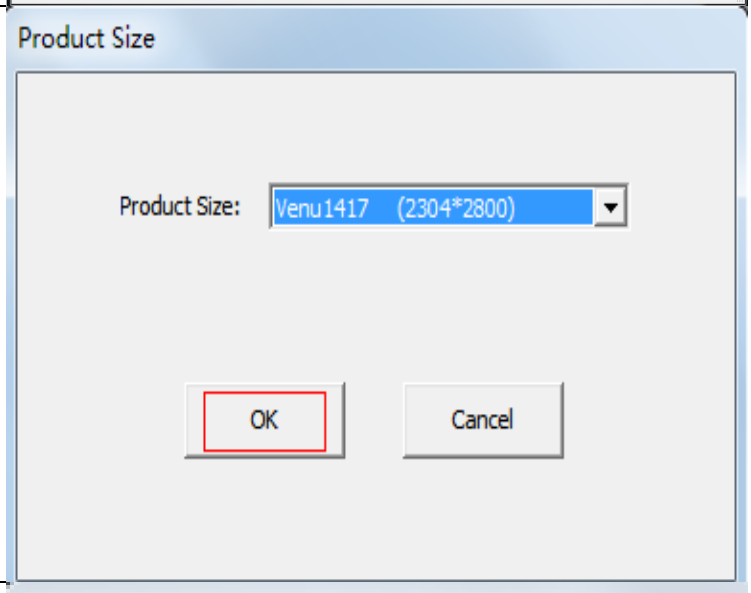
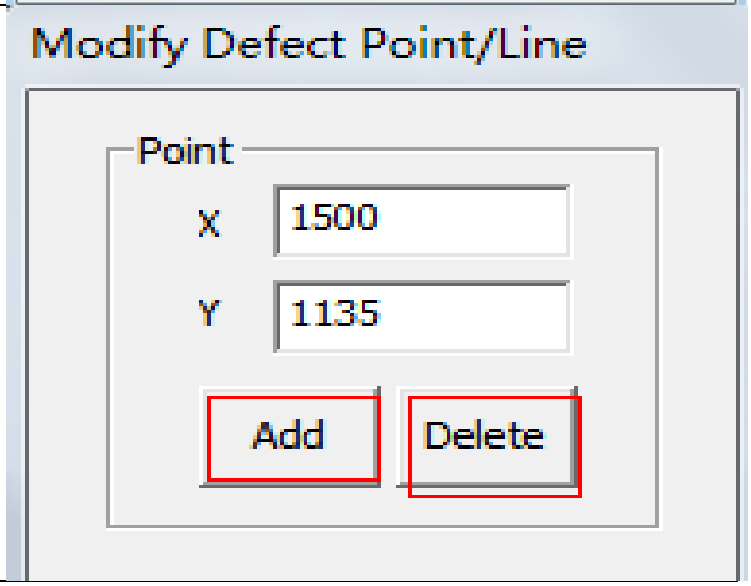
4.8.1 Defect Template Check

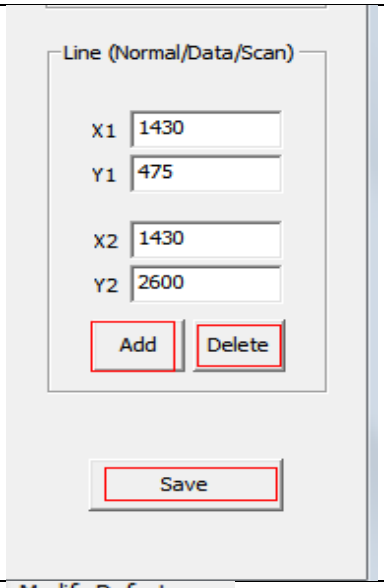
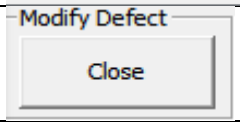
Click “Open”	

Select defect template; Click “open”;	
Select Product Size “Venu1417 (2304*2800); Click “OK”, Defect template is shown on screen;	
Click “Close” to close Defect template	

4.8.2 Defect Template Modification

Click “Open”	

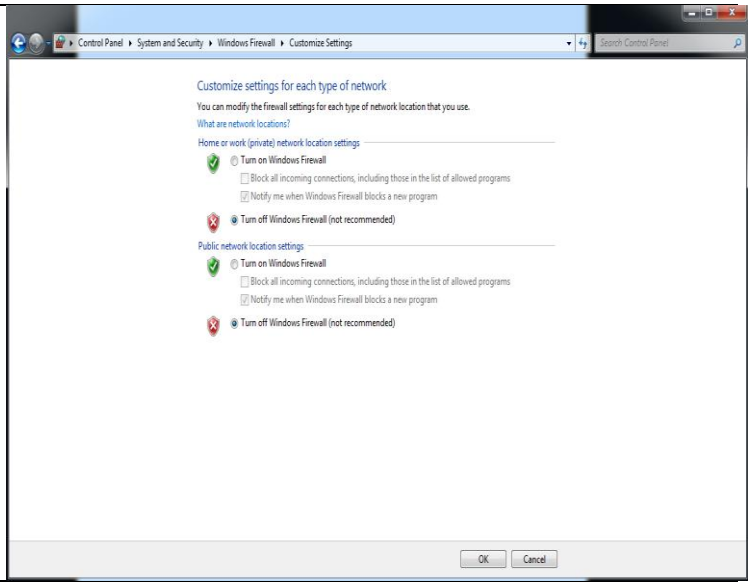
Select Defect Template; Click “Open”;	
Set product size “Venu1417 (2304*2800); Click “OK”	
If there is new defect pixel, input coordinate, click “Add”; If pixel is labeled as defect by mistake, input coordinate, click “Delete”	

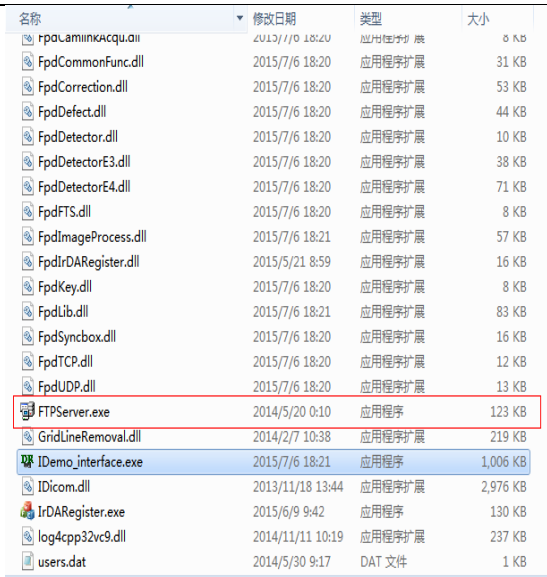
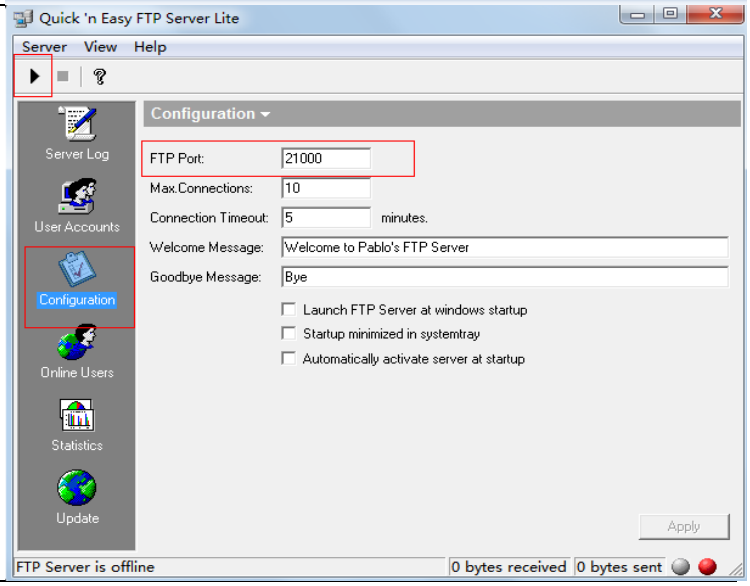
If there is new defect line, input coordinate, click “Add”; If line is labeled as defect by mistake, input coordinate, click “Delete”	
Click “Close”	

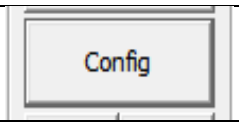
4.9 Correction and Calibration Management

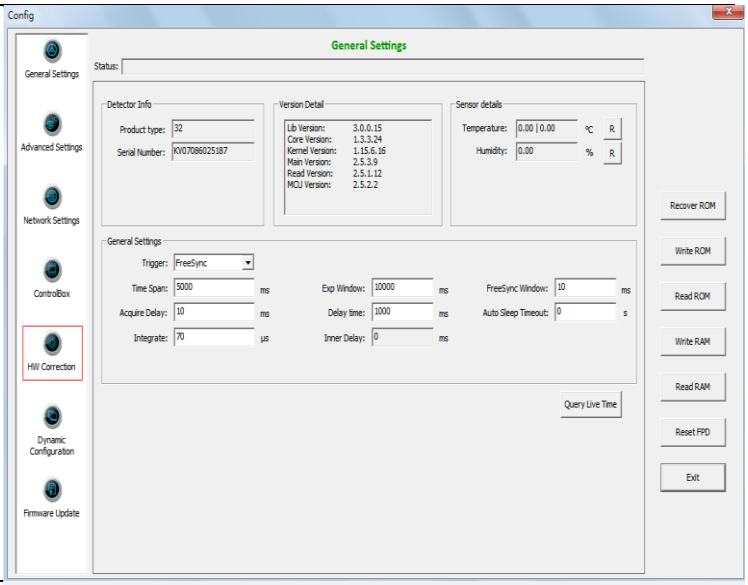
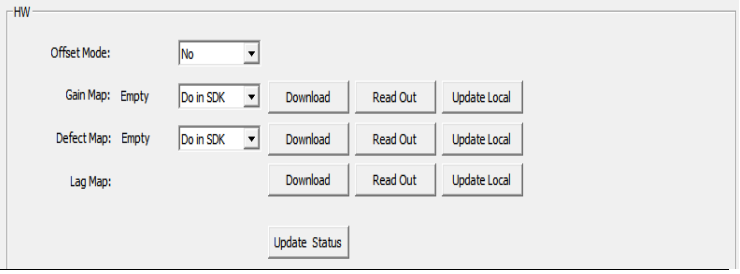
4.9.1 Correction and Calibration template synchronization

Panel supports correction and calibration template storage. So template in panel could be uploaded to Workstation, and template in Workstation could also be downloaded to panel. Before synchronization, FTP server is necessary.

Make sure firewall is closed	

Start “FTPServer.exe”	
Choose “Configuration”; Set FTP Port “21000”; Click “Start” button;	

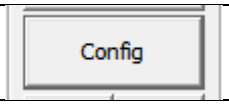
Click “Config”	

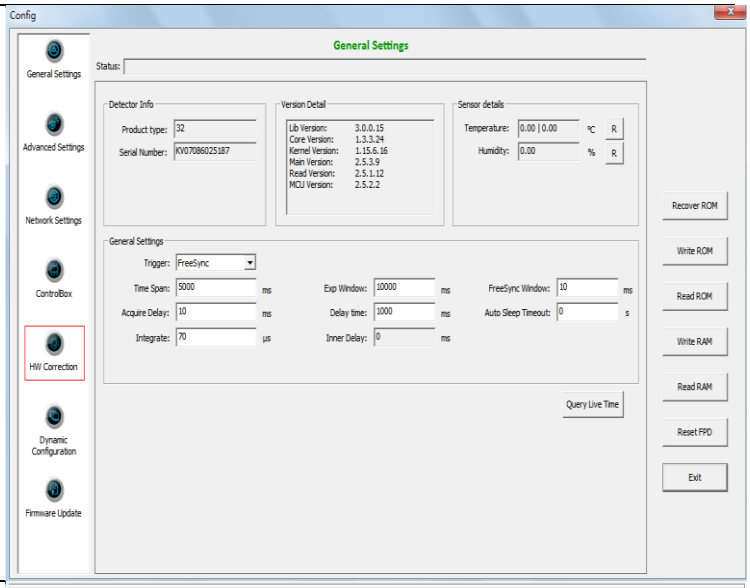
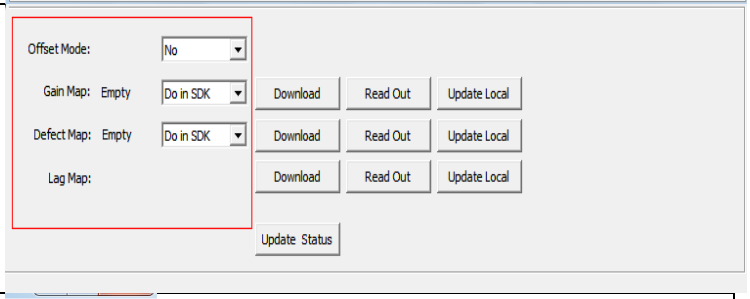
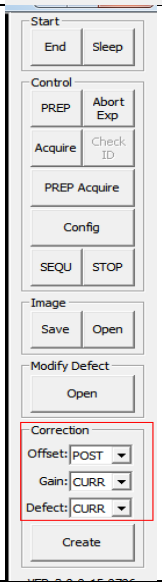
Select “HW Correction”	
If user wants to download correction and calibration template to panel. Click “Download” from top to bottom; If user wants to upload correction and calibration template from panel. Click “Read out” and “Update Local” from top to bottom;	

4.9.2 Correction and Calibration management

Panel supports two ways to do correction and calibration. Software Correction and Calibration defines the scenario that Workstation completes all correction and calibration. If panel complete all correction and calibration by itself, it is named as Hardware Correction and Calibration.

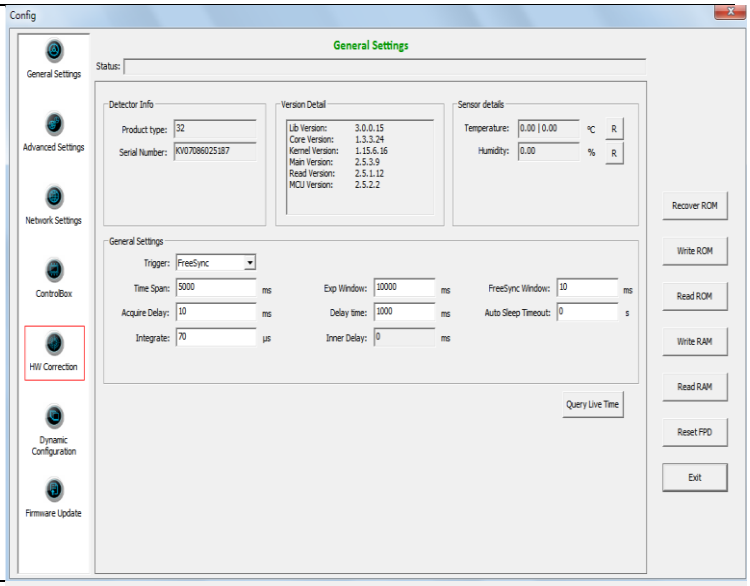
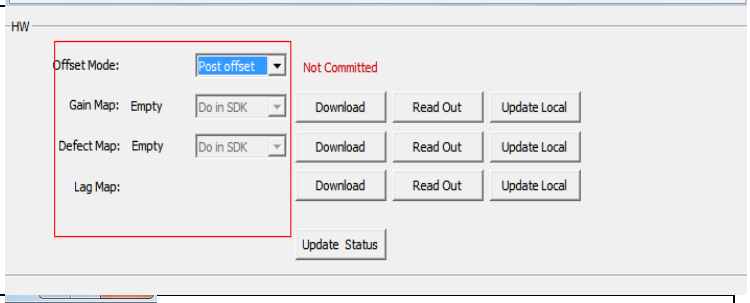
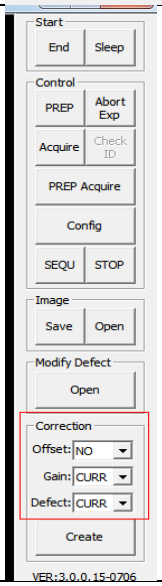
4.9.2.1 Software Correction and Calibration

Click “Config”	

Select “HW Correction”;	
Set Offset Mode “NO”;	
Set Offset “POST”; Set Gain “CURR”; Set Defect “CURR”;	

4.9.2.2 **Hardware Correction and Calibration Management**

Click “Config”	

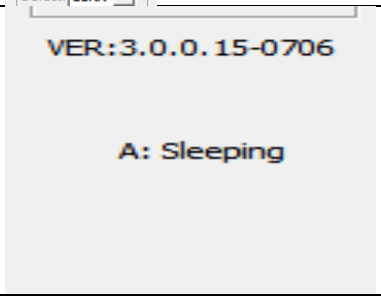
Select “HW Correction”;	
Set Offset Mode “Post offset”;	
Set Gain “CURR”; Set Defect “CURR”;	

4.10 Sleep and Wake Up

Panel supports sleep and wake up operation. User can trigger sleep manually or automatically, but there is only one way to wake up panel.

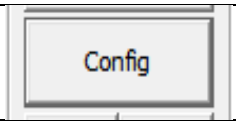
4.10.1 Sleep

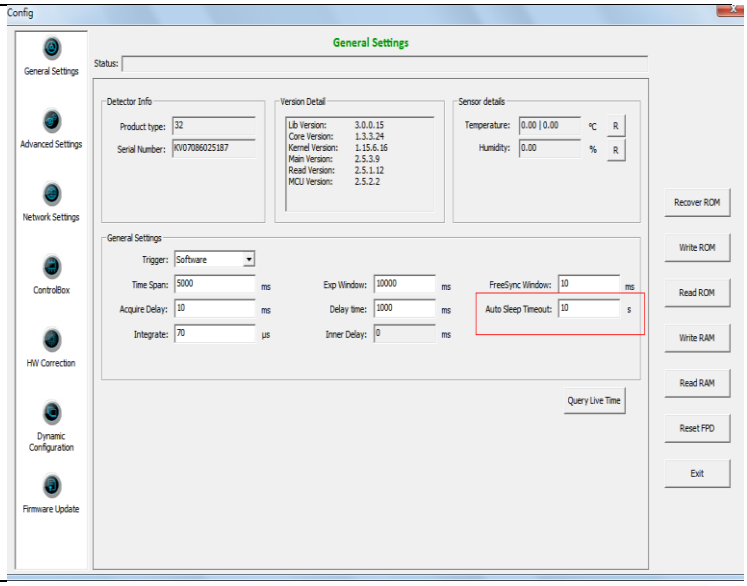
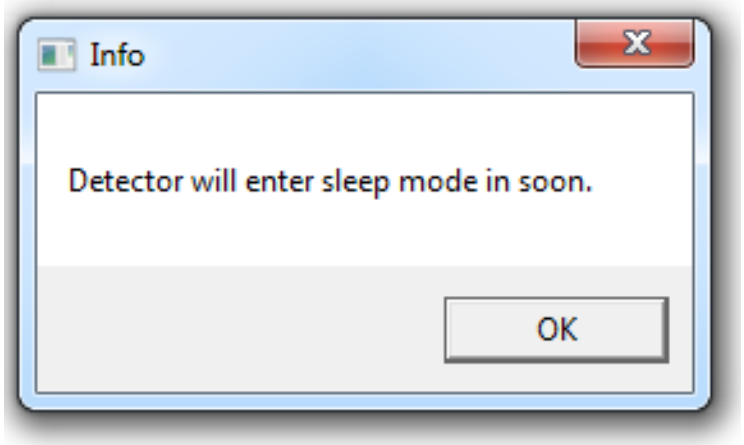
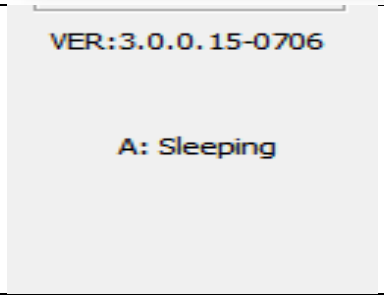
4.10.1.1 Manual Sleep

Click “Sleep”, panel will go to sleep immediately	
Message box shows that panel is sleeping	

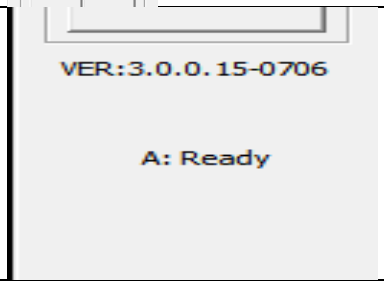
4.10.1.2 Automatic Sleep

To go to sleep automatically, user should set the time flag first. If panel detects that there is no operation in time flag, panel would go to sleep. If time flag is set zero, panel would not go to sleep automatically.

Click “Config”	

Set “auto sleep timeout” value user need	
If there is no operation in time flag user sets, panel would go to sleep	
Message box shows that panel is sleeping	

4.10.2 Wake Up

If panel is sleeping, click “Wake Up”	
Message box shows that panel is ready	

Note: panel is allowed to waked up in 3 seconds after sending manual sleep command or going in sleep automatically.

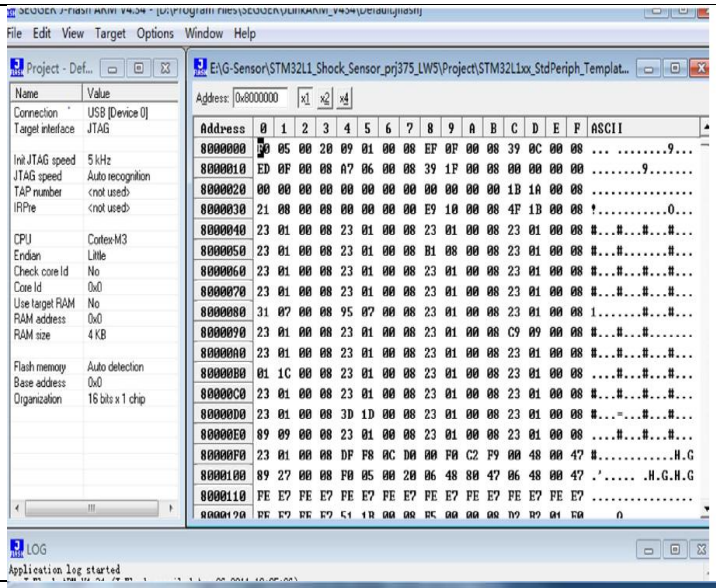
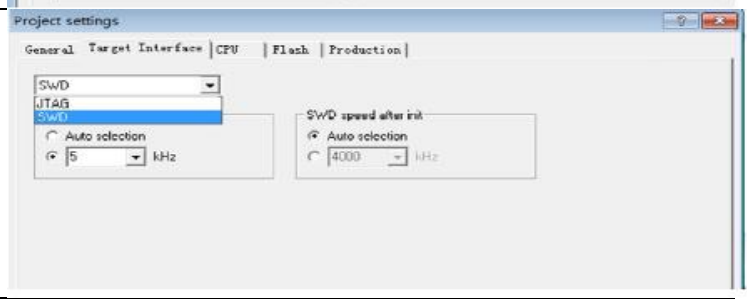
4.11 Firmware Update

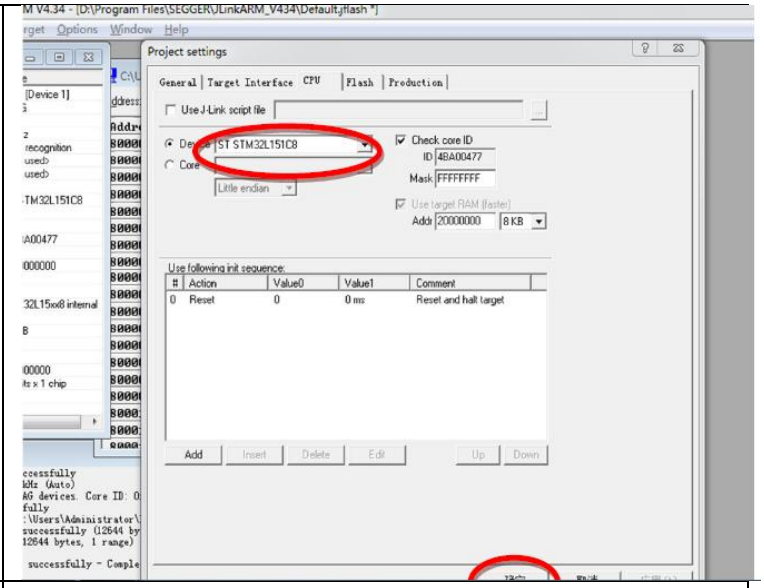
Panel supports updating firmware with idemo, please do not use Web to update firmware. If user wants to update new firmware, see below

4.11.1 MCU Update

If current MCU version is 2.5.1.*, we should follow instruction below.

Open “mini Cover”	/
Remove original Ethernet cable, insert J-link download cable	/
Start J-flash ARM	/

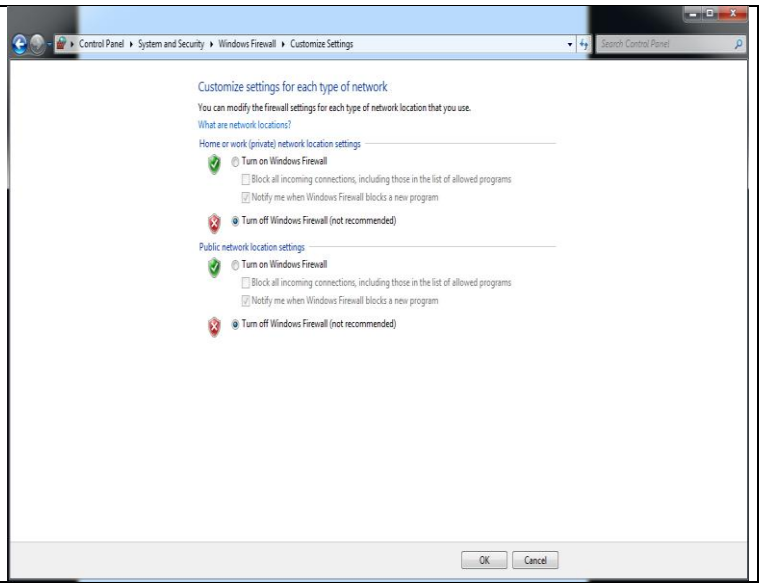
Click “file->open data file”	
Click “option->project setting”, Set “connection to J-link” USB mode	
Click “Target Interface”, Choose “SWD”	

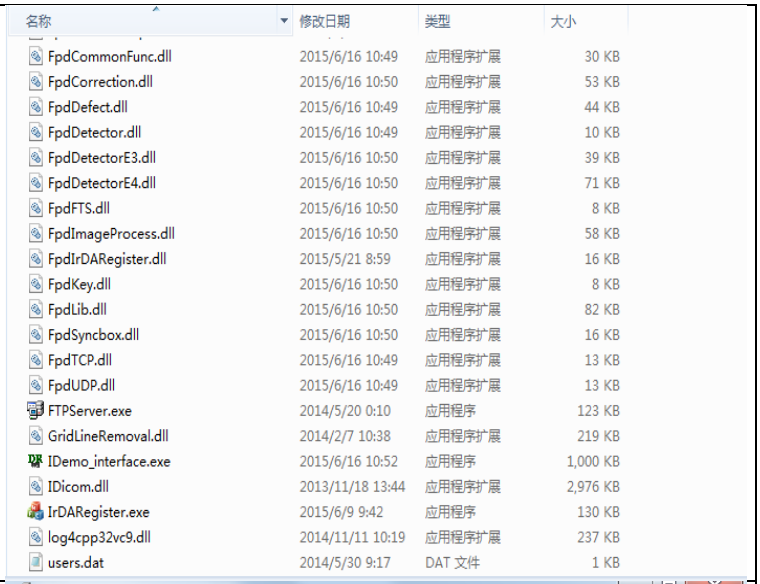
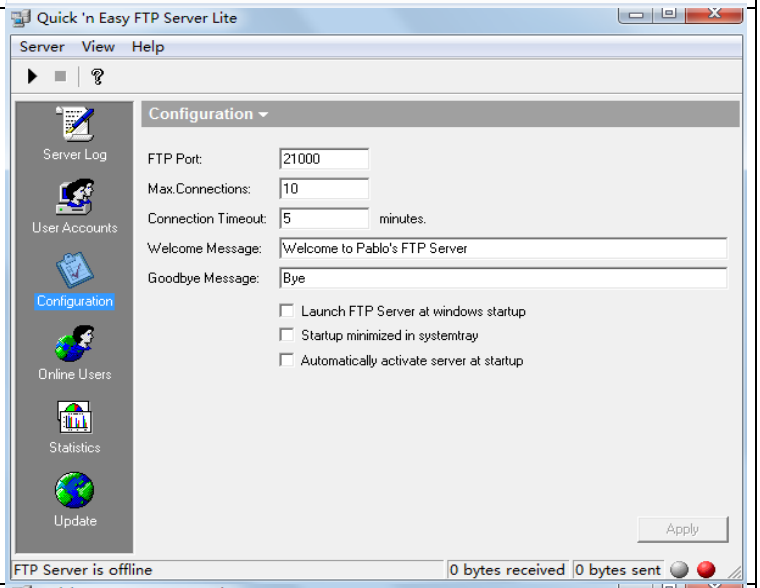
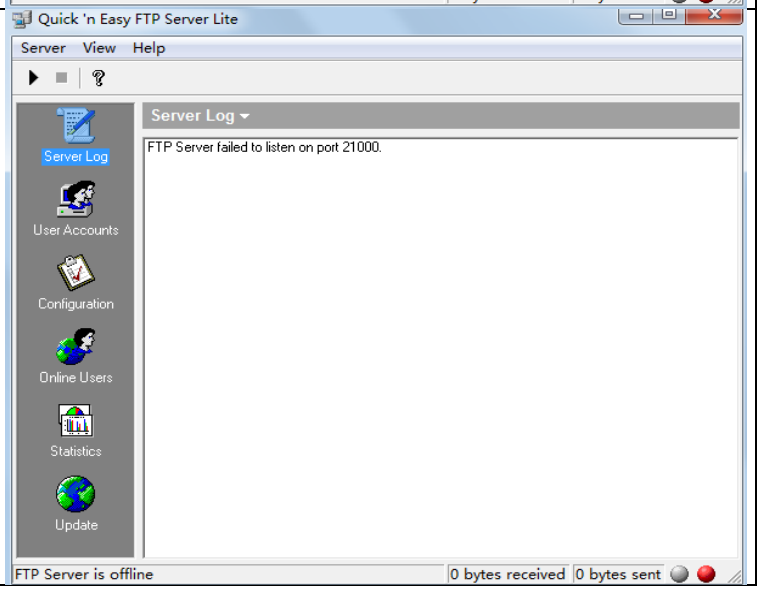
Click “ CPU”; Select “ST STM32L151C8”;	
Click “Target->Connect”	/
Click “Target-> Erase”	/
Click “Target->Program”	/
Click “Target->Start Application”	/

Note:1. Make sure panel is powered up.

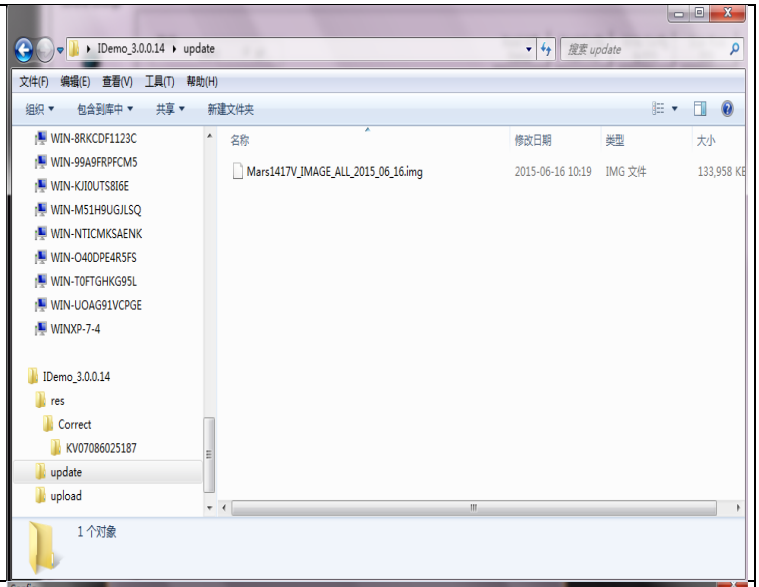
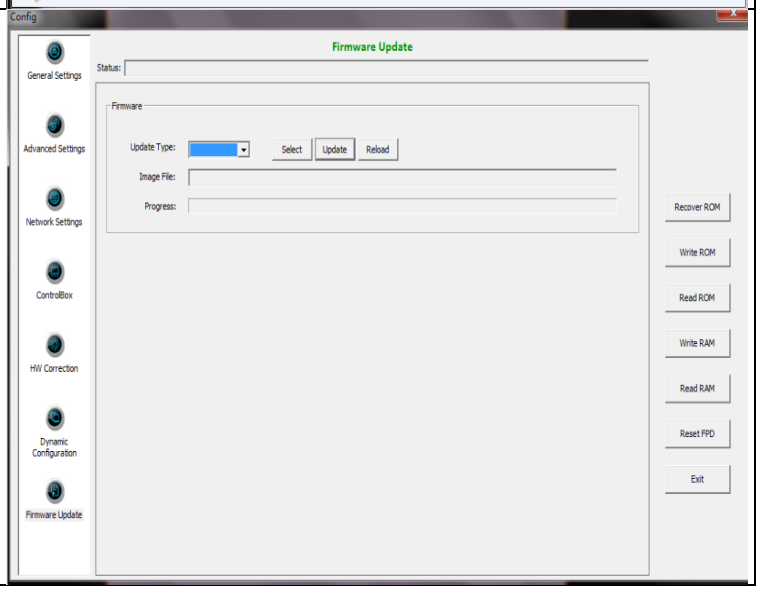
If current MCU version is 2.5.2.*, Please refer to 4.10.2 and 4.10.3 for upgrading.

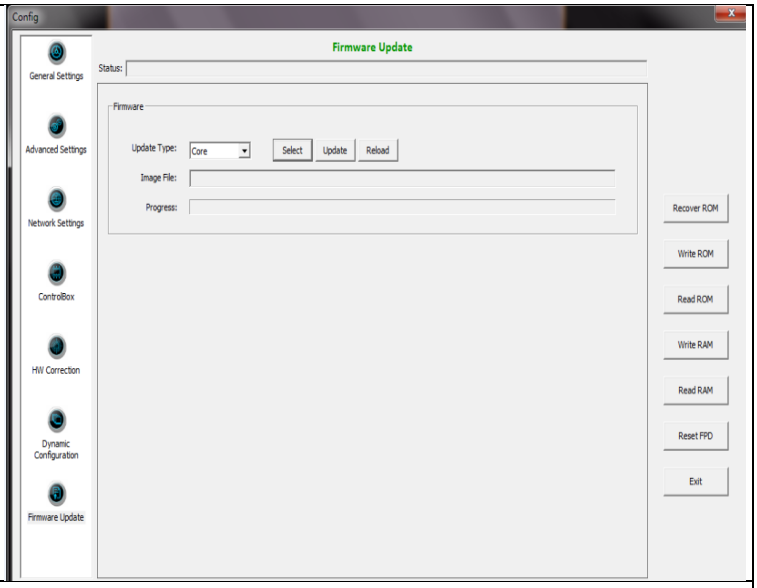
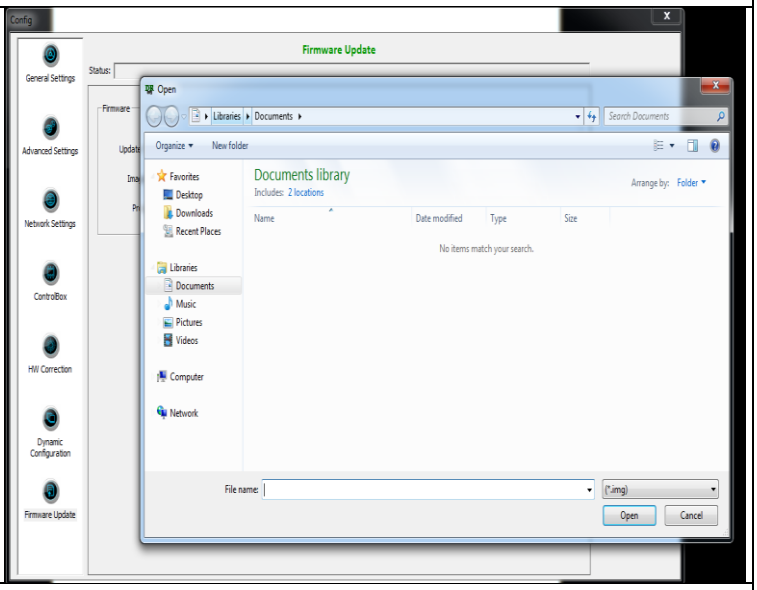
4.11.2 FTP Server

Make sure firewall is closed	

Click On “FTPServer.exe”	
Choose “Configuration”, set “FTP Port” 21000, others as default	
Start FTP Server	

4.11.3 Firmware Update

Put update file in the directory of “*\idemo\update”	
Click “Config”, Choose Firmware Update	

Choose Update Type “core[1]”	
Click “Select”, choose right update file[2]	
Click “update”, waiting for message box[3]	
Click message box, waiting for end of rebooting[4]; Panel finishes rebooting, Click “OK”[5]	/

Note:

1. It is not limited to “Core”, actually, other choice is also ok.

2. If it is MCU update, choose MCU image file. Otherwise, choose ALL-Image file, Please make sure update file is selected, if not, panel will be not in use after updating.

3. There is a progress bar for indication. Make sure battery is inserted and battery capacity is over 25%

4. This rebooting function is controlled by panel itself. It has the same function with “ Reset FPD”

5. Please make sure Idemo show “ Ready”. It can also be checked by click “ Config” button, there is firmware version.

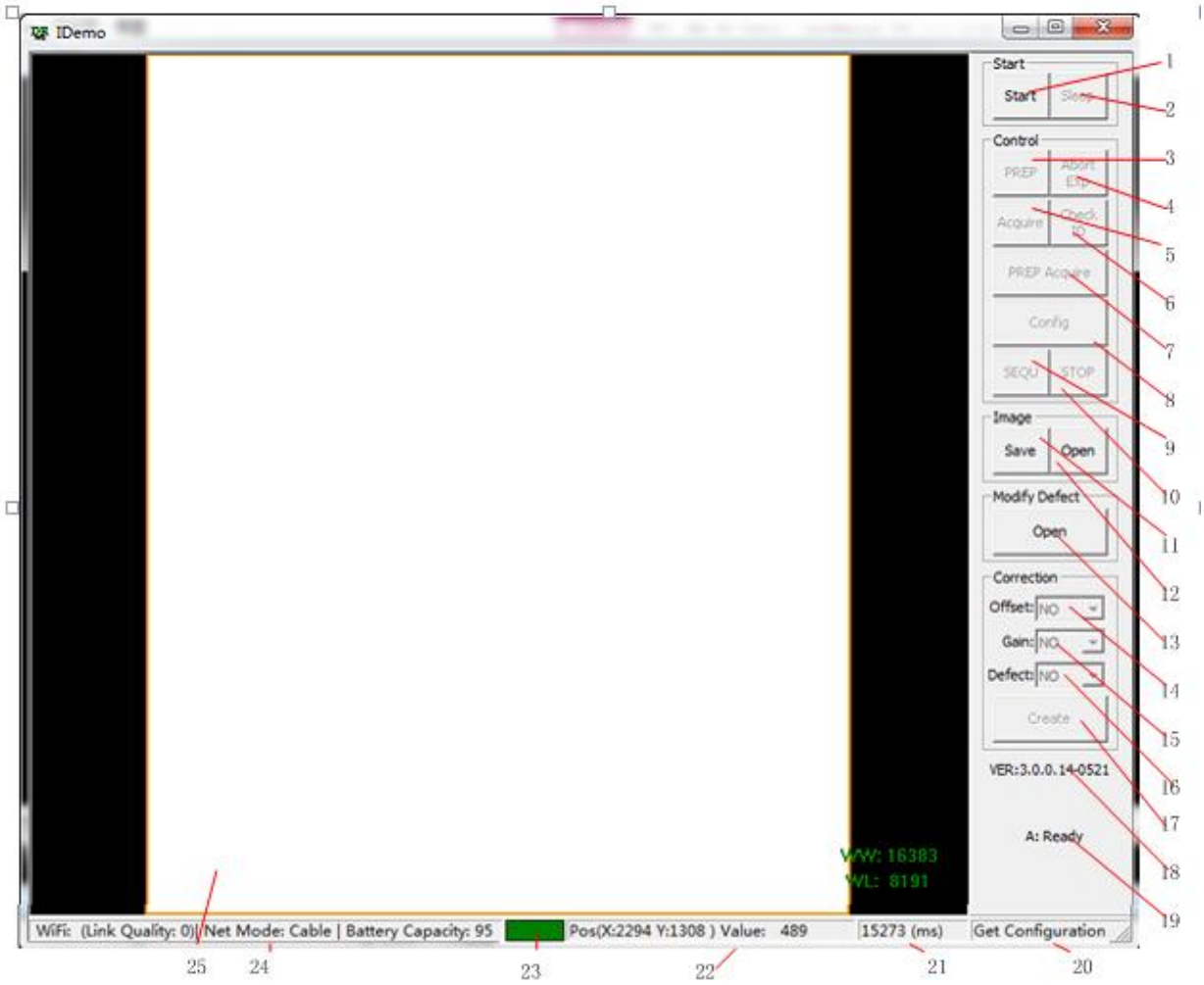
4.12 Short cut

iDemo supports some shortcuts as follows:

- Double-click the left mouse button, the image displayed in center and with maximum size.
- Double-click the right mouse button, the window level and width adjusted to WL:8191/WW:16383.
- Drag the left mouse button, drag the image displayed.
- Lateral-drag the right mouse button to adjust the window width, and vertical-drag the right mouse button to adjust the window level.
- F3 Key: Quickly adjust the image window width and window level.

4.13 Software

4.13.1 Main GUI



iRay provides test tools, such as iDemo for testing the basic performance of detector. It can connect the detector, acquire image, image correct and calibrate.

Function description of regions and buttons within the main window as follows:

1	Start/End	Load or unload NIC device driver	13	Open/Close	Open or close defect map
2	Sleep/Wake	Sleep or wake up panel	14	Offset	Open or close software post offset
3	Prep	Clear lags of the panel	15	Gain	Open or close gain calibration
4	Abort Exp	Close exposure Window	16	Defect	Open or close defect correction
5	Acquire	Acquire an image without clearance	17	Create	Generate gain template and defect template

6	Check ID	Check panel SN	18	Version of the idemo
7	Prep Acquire	Clear lags and acquire an image	19	Status of the idemo
8	Config	Configure the panel	20	Panel feedback message
9	Sequ	Start acquiring images continually	21	Acquisition interval between two images
10	Stop	Stop acquiring images continually	22	Pixel X/Y coordinate and gray scale value of Pixel(14 bit)
11	Save	Save images continually or save an image	23	Image acquisition instruction box
12	Open	Open local images(.DCM) or open images in the panel	24	WiFi signal and battery capacity indication
			25	Region of image display

4.13.2 Message Box

4.13.2.1 Status Box

Status box defines the current status of panel.

Value	Description
Offline	Idemo loose connection with panel, it does not receive heart beat
Ready	Idemo builds connection with panel, panel is ready for receiving new operation
Busy	Idemo builds connection with panel, panel is busying on the last operation, it can not be interrupted
Sleeping	Idemo builds connection with panel, panel has gone in sleep
Waking	Idemo builds connection with panel, panel is being wake up
Timeout	Command executes overtime

4.13.2.2 **Feedback Box**

Feedback box shows feedback message from panel.

4.13.2.3 **Acquisition Interval Box**

Acquisition Interval Box shows the time between two image acquired currently.

4.13.2.4 **Coordinate and Gray Scale Box**

Coordinate and Cray Scale Box show the coordinate and gray scale of mouse.

4.13.2.5 **Image Acquisition Box**

Image Acquisition Box shows whether image is uploading

Color	Description
Red	Image is uploading from panel
Green	others

4.13.2.6 **Battery and Connection Box**

Battery and Connection Box shows battery capacity, wireless signal level and wire connection.

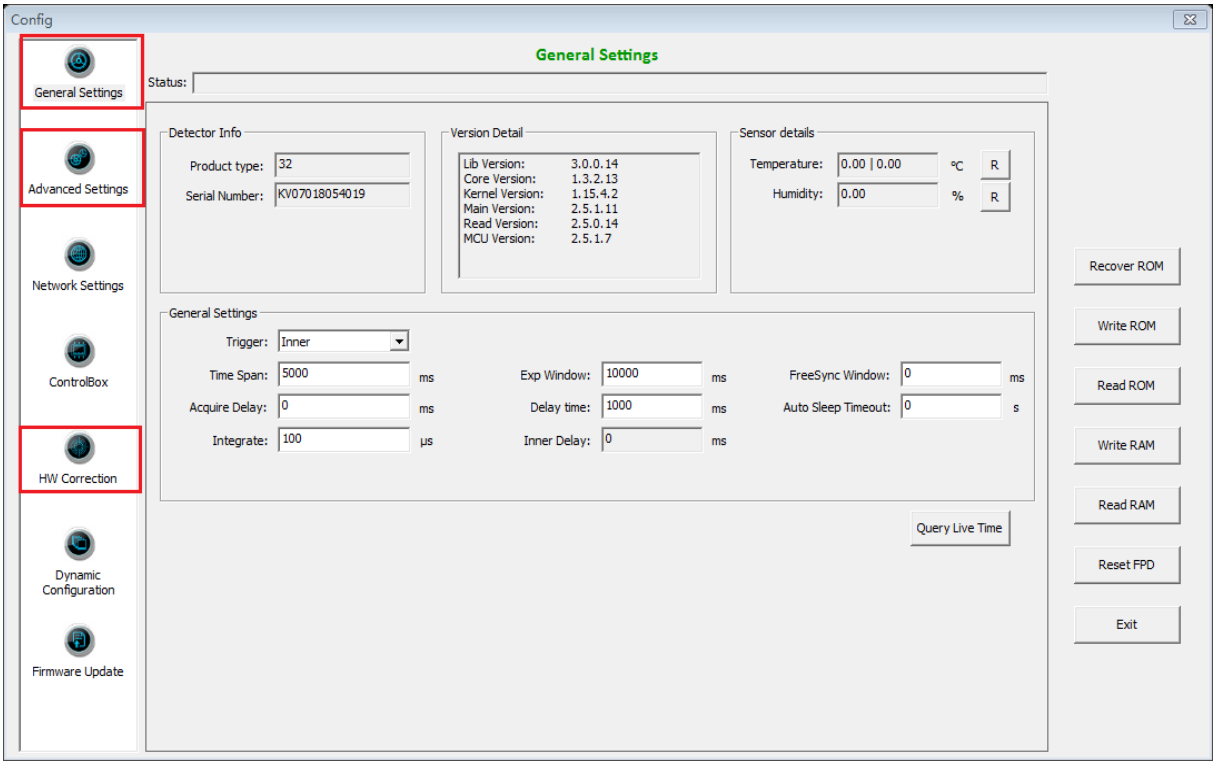
4.13.2.7 **Progress Bar**

Progress Bar defines as following.

If progress bar is Green when shooting X ray, image quality is acceptable, otherwise image quality would degrade.

4.13.3 Configuration GUI

4.13.3.1 General Settings

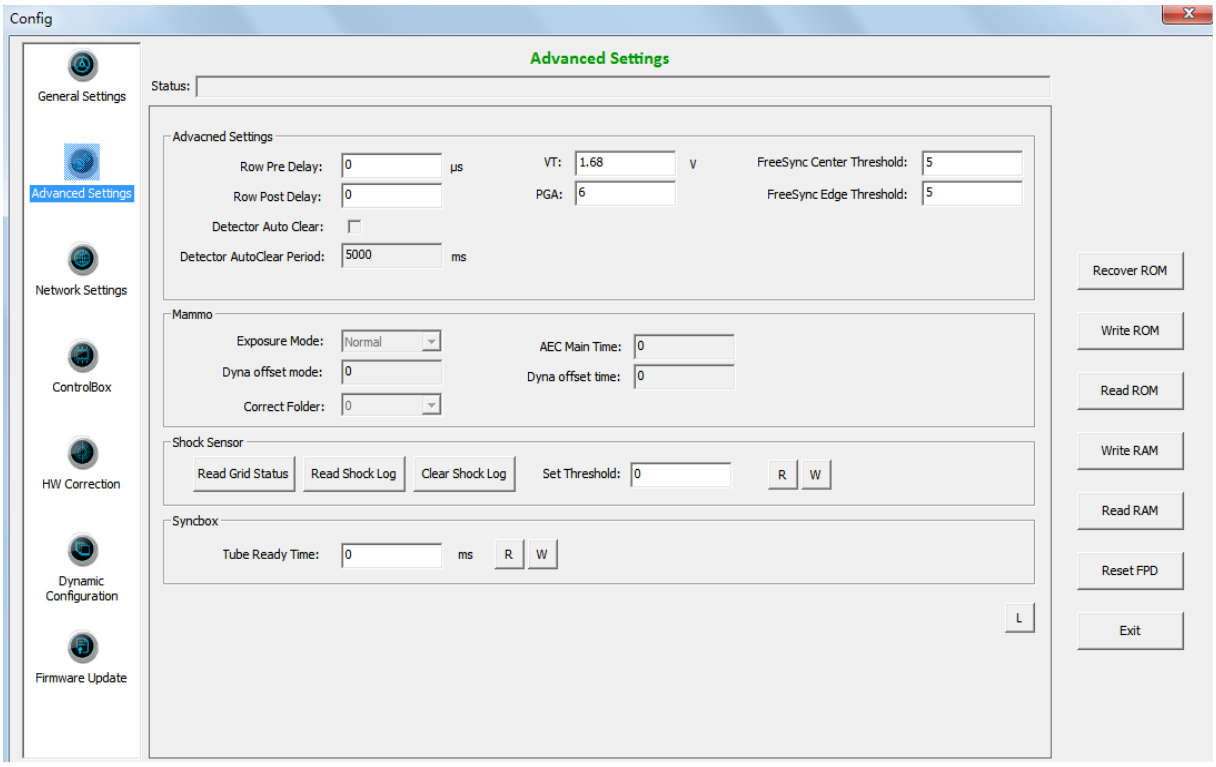


Item		Description	Modify
Detector Info	Product type	Type of panel product	NO
	Serial Number	Serial number of the panel	NO
Version Detail	Lib Version	Version number of idemo	NO
	Core Version	Version number of ARM application	NO
	Kernel Version	Version number of ARM OS Kernel	NO
	Main Version	Version number of Core FPGA	NO

	Read Version	Version number of Read FPGA	NO
	MCU Version	Version number of MCU	NO
Sensor details	Temperature	Panel inner temperature(Read Board and Core Board)	NO
	Humidity	Panel inner Humidity	NO
General Settings	Trigger	Detector trigger mode: 1.Outer 2.Inner 3.Software 4.PREP 5.Service 6.FreeSync (Default)	YES
	Time Span	This parameter is used only in continual acquisition. The time span is the time interval between two nearby acquisition process	YES
	Exp Window	Exposure window is used in Inner mode, it defines the time for X ray shooting.	YES
	FreeSync Window	Not Used	YES
	Acquire Delay	Delay time before image acquisition.	YES
	Delay time	Exposure Window in Isync Plus mode/Delay time between clearance and acquisition in other mode.	YES
	Auto Sleep Timeout	Time span of idle before going to sleep	YES
	Integrate	The integration time for the photo diode	NO
	Inner Delay	The real delay time between clearance and acquisition most recently.	NO
Button	Recover ROM	Recover configuration to factory setting	/
	Write ROM	Write configuration data into nonvolatile memory	/
	Read ROM	Read configuration data from nonvolatile memory	/
	Write RAM	Write configuration data into volatile memory	/
	Read RAM	Read configuration data into volatile memory	/
	Reset FPD	Reboot the panel	/

	Exit	Exit configuration GUI	/
	Query Live Time	Check the active time of panel	/

4.13.3.2 **Advanced Settings**

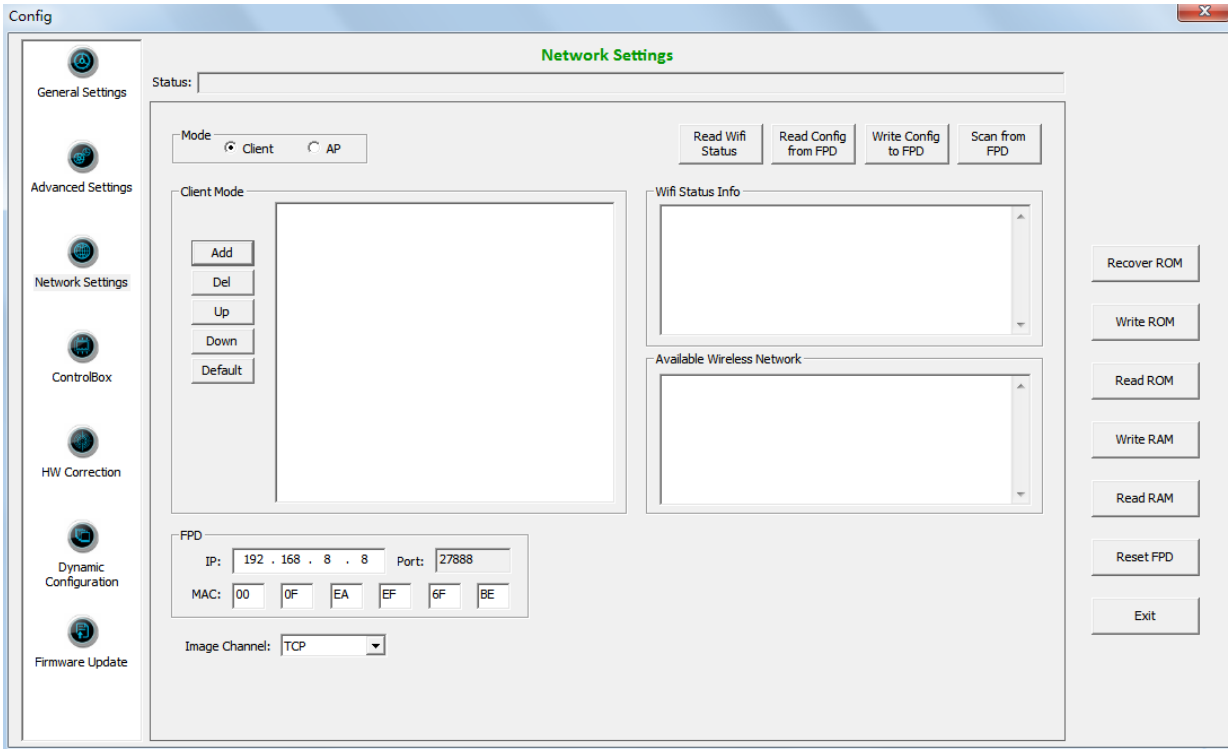


Item		Description	Modify
Advacned Settings	Row Pre Delay	Delay time before acquiring row data	YES
	VT	Voltage corresponding to the charge compensation	YES
	Freesync Center Threhold	Not used	YES
	Row Post Delay	Delay time after acquiring row data	YES
	PGA	Integrator capacitor range.	YES
	Freesync Edge Threhold	Not used	YES
	Detector Auto Clear	Set the detector in auto clear mode	NO
	Detector Auto Clear Period	Auto clear period for panel	NO
Mammo	Exposure Mode	Not used	NO
	AEC Main Time	Not used	NO

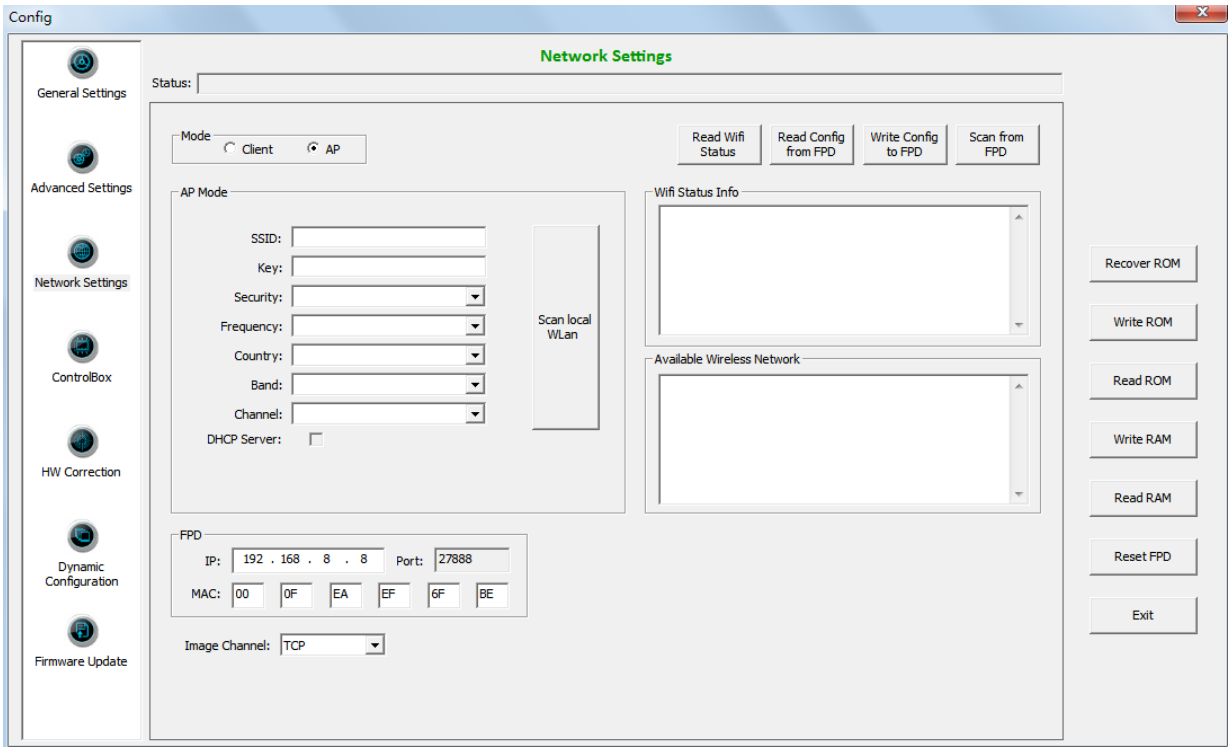
	Dyna Offset Mode	Not used	NO
	Dyna Offset Time	Not used	NO
	Correct Folder	Not used	NO
Shock Sensor	Read Grid Status	Not used	NO
	Read Shock log	Read shock sensor log	NO
	Clear Shock Log	Clear shock sensor log	NO
	Set Threshold	Shock sensor threshold	YES
	R	Read Shock sensor threshold from panel	NO
	W	Write Shock sensor threshold to panel	NO
Syncbox	Tube Ready Time	Not used	NO
	R	Not used	NO
	W	Not used	NO
Button	L	Read Log from panel	NO

4.13.3.3 **Network Settings**

Client Mode:



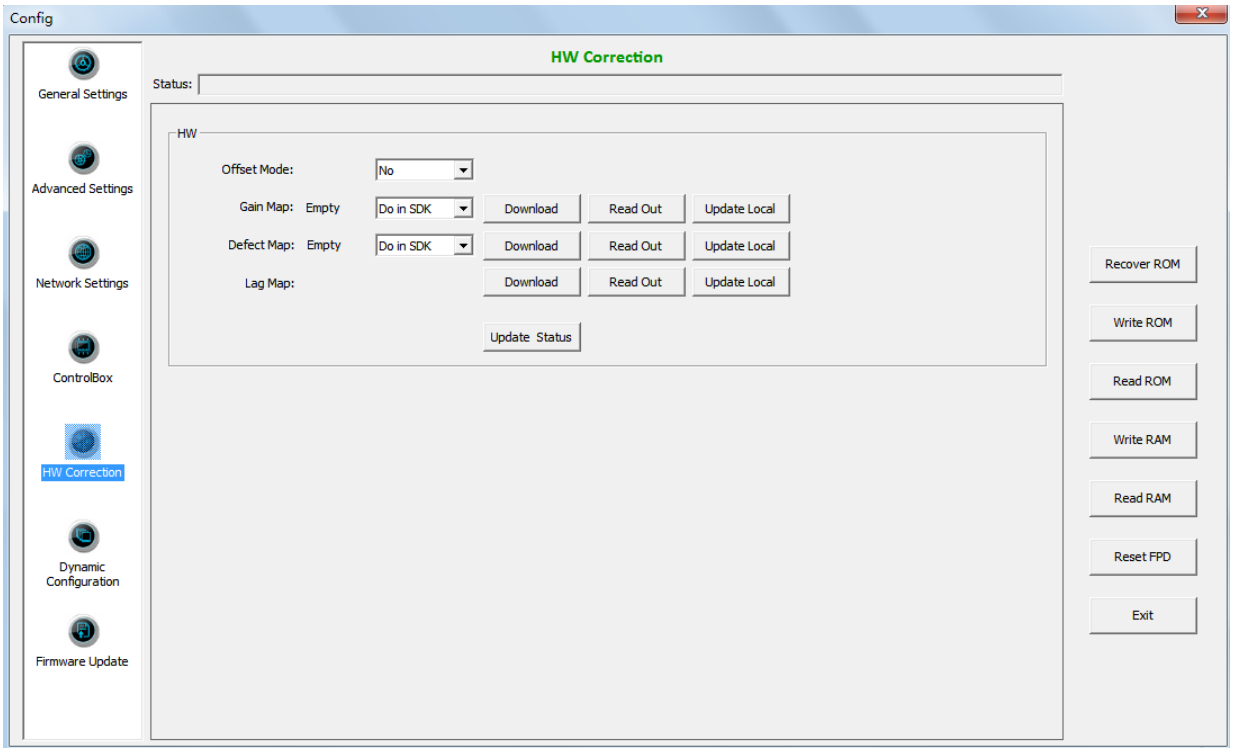
AP Mode:



Item		Description	Modify
Mode	Client	Set panel in client mode	NO
	AP	Set panel in AP mode	NO
Client Mode	Add	Add available wireless AP account	NO
	Del	Delete Exist wireless AP account	NO
	Up	Wireless AP account move up	NO
	Down	Wireless AP account move down	NO
	Default	Set AP account as default connection	NO
AP Mode	SSID	Wireless AP SSID when panel in AP mode	YES
	Key	Wireless AP Key when panel in AP mode	YES
	Security	Wireless AP Security method when panel in AP mode	YES
	Frequency	Wireless AP frequency(2.4GHz and 5GHz) when panel in AP mode	YES
	Country	Wireless AP Country when panel in AP mode	YES
	Band	Wireless AP Band(HT20 and HT40) when panel in AP mode	YES
	Channel	Wireless AP Channel when panel in AP mode	YES

	DHCP Server	DHCP function when panel in AP mode	YES
	Scan Local Wlan	Scan local wifi signal when panel in AP mode	YES
FPD	IP	Network IP address of panel	YES
	Port	Network Port of panel	NO
	MAC	Network MAC address of panel	YES
	Image Channel	Network protocol of panel	YES
Button	Read Wifi Status	Read wireless module status from panel	NO
	Read Config from FPD	Read wireless module setting from panel	NO
	Write Config to FPD	Write wireless module setting to panel	NO
	Scan from FPD	Scan Wifi signal by panel	NO

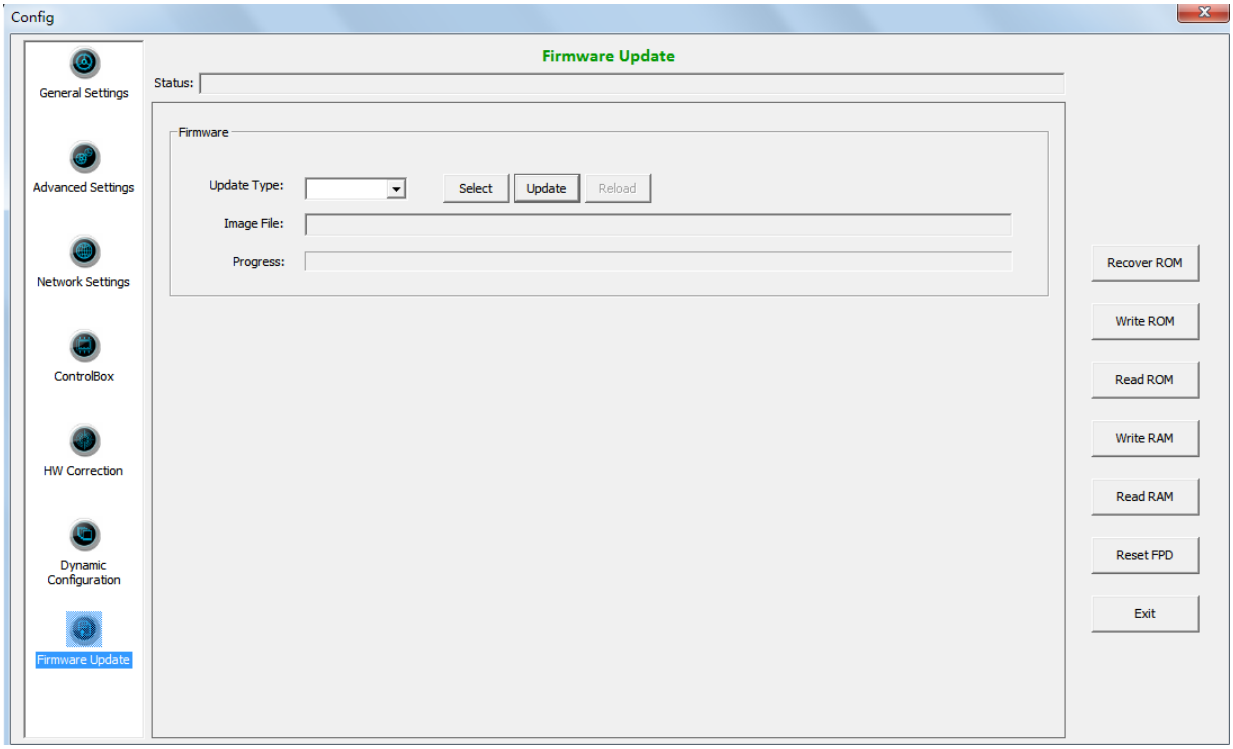
4.13.3.4 **HW Correction**



Item		Description	Modify
HW	Offset Mode	Hardware offset mode of panel NO: no hardware offset mode Pre: hardware pre-offset mode	YES

		Post: hardware post-offset mode	
	Gain Map	Gain calibration mode of panel Do in SDK: software gain calibration Do in HW: hardware gain calibration	NO
	Defect Map	Defect correction mode of panel Do in SDK: software defect correction Do in HW: hardware defect correction	NO
	Lag Map	Lag correction of panel	NO
	Download	Download correction and calibration template to panel	NO
	Read out	Upload correction and calibration template from panel	NO
	Update local	Replace local correction and calibration template with template uploaded currently	NO
	Update status	Get correction and calibration configuration from panel	NO

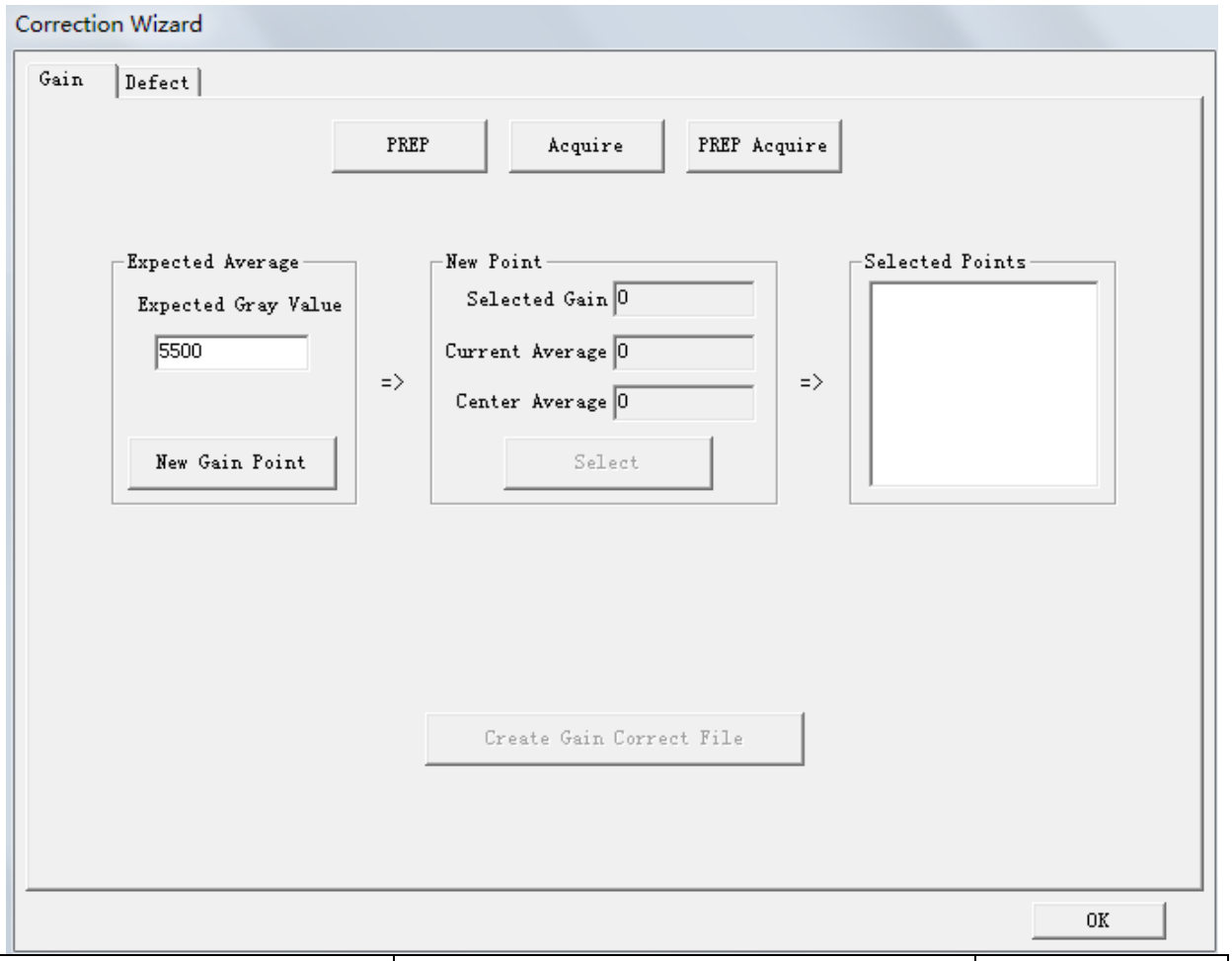
4.13.3.5 Firmware Update



Item		Description	Modify
Firmware	Update Type	Not used	YES
	Image File	Local address of update file	NO
	Progress	Progress bar of updating	NO
	Select	Select update file	NO
	Update	Start update	NO
	Reload	Reload firmware of panel	NO

4.13.4 Correction and Calibration

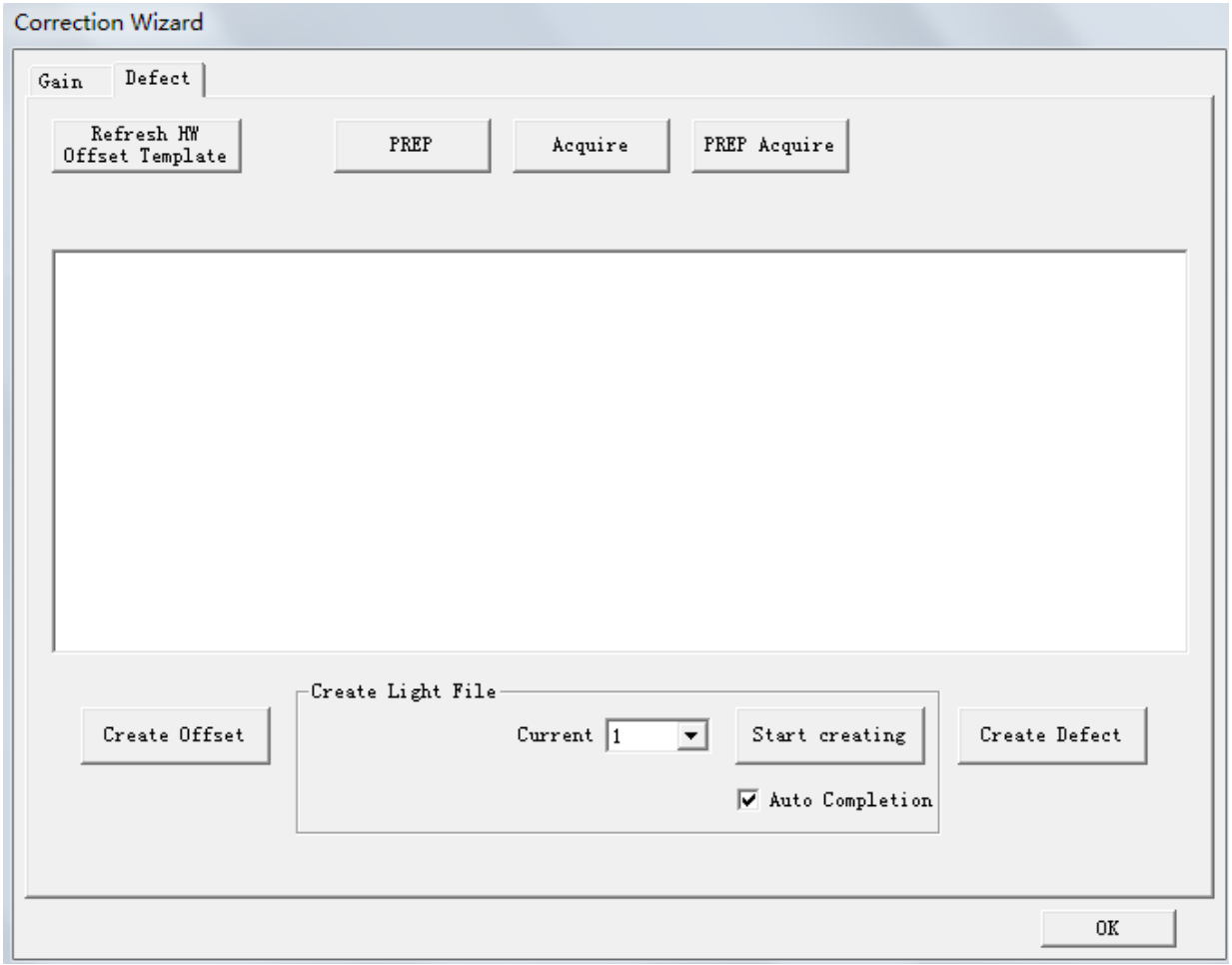
4.13.4.1 Gain Calibration



Item		Description	Modify
Expected Average	Expected Gray Value	Not used	YES
	New Gain Point	Start generating gain template	NO
New Point	Selected Gain	Number of selected gain point	NO
	Current Average	Average value of the complete image	NO
	Center Average	Average value of the image in center ROI (100X100)	NO
	Select	Select and save current gain point	NO
Button	Prep	Send “Clear” command to panel	NO
	Acquire	Send “Acquire” command to panel	NO
	Prep Acquire	Send “Clear Acquire” command to panel	NO
	Create Gain Correct	Start generating gain Calibration template	NO

	File		

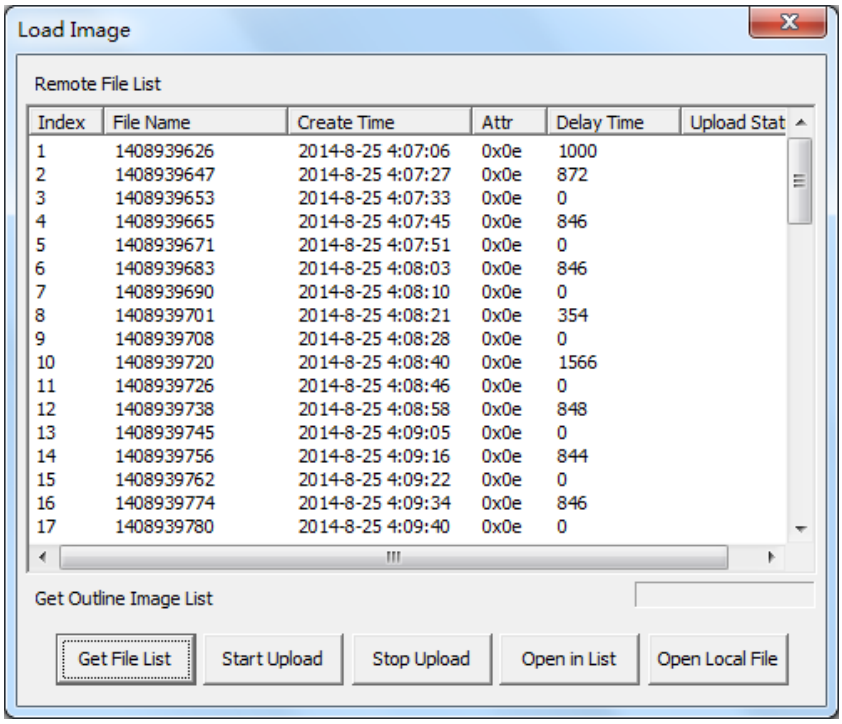
4.13.4.2 **Defect Correction**



Item		Description	Modify
Create Light File	Current	Current sequence of defect point	NO
	Start creating	Start defect point acquisition	NO
	Auto completion	Automatically acquire defect point	NO
Button	Refresh HW Offset Template	Updating pre-offset template in panel	NO
	Prep	Send “Clear” command to panel	NO
	Acquire	Send “Acquire” command to panel	NO
	Prep Acquire	Send “Clear Acquire” command to panel	NO
	Create Offset	Generate pre-offset template	NO

	Create Defect	Generate Defect correction template	NO

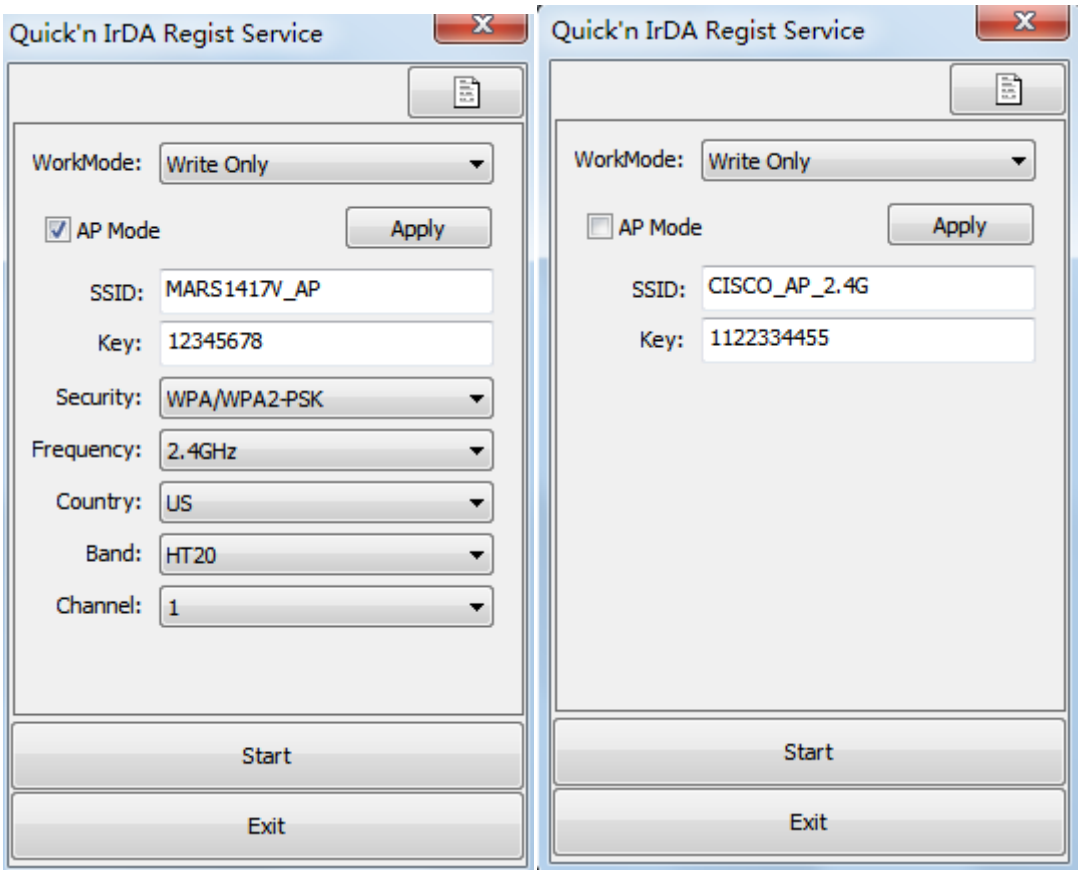
4.13.5 Image Check and upload



Item		Description	Modify
Remote File List	Index	Sequence number of image	NO
	File name	Name of image in panel	NO
	Create Time	Acquisition time of image in panel	NO
	Attr	Image label 0x01—Do Offset 0x02—Do Gain 0x04—Do Most gain 0x08—Do Defect 0x10—Post Offset Raw Image	NO
	Delay Time	Time between clear and image acquisition	NO
Button	Get File List	Get file list from panel	NO
	Start Upload	Start uploading image selected	NO
	Stop Upload	Stop uploading process	NO

	Open in List	Open image selected	NO
	Open Local File	Open local images in Workstation	NO

4.13.6 Infrared Registration



Item		Description	Modify
/	Work Mode	Work mode of infrared registration tools Write Only: infrared registration tools is allowed to write to panel Read Only: infrared registration tools is allowed to read from panel Read & Write: infrared registration tools is allowed to read from panel and write to panel Read &confirm by User: infrared registration tools is allowed to read from panel and write to panel only when confirmed by user	YES

AP Mode Configuration	AP Mode	Set panel in AP mode or Client mode	YES
	SSID	Wireless AP SSID when panel in AP mode	YES
	Key	Wireless AP Key when panel in AP mode	YES
	Security	Wireless AP Security way when panel in AP mode	YES
	Frequency	Wireless AP Frequency(2.4GHz and 5GHz) when panel in AP mode	YES
	Country	Wireless AP Country Code when panel in AP mode	YES
	Band	Wireless AP Band(HT20 and HT40) when panel in AP mode	YES
	Channel	Wireless AP Channel when panel in AP mode	YES
Client Mode Configuration	SSID	Wireless SSID when panel in Client mode	YES
	Key	Wireless Key when panel in Client mode	YES
Button	Apply	Save wireless parameter in infrared registration tools	NO
	Start	Start write wireless parameter in panel	NO
	Exit	Exit infrared registration tools	NO

5 Regulatory Information

5.1 Medical equipment safety standards

◆ Medical equipment classification

Type of protection against electrical shock	External electrical power source equipment Class I Equipment, with wiring unit
Degree of protection against electrical shock	Without Applied Parts
Degree of protection against ingress of water	IPX0
Mode of operation	Continuous operation
Flammable anesthetics	Not suitable for use in the presence of a flammable anesthetic mixture with air or with oxygen or nitrous oxide

	Not suitable for use in the oxygen rich environment

◆ Product safety standards

MDD (93/42/EEC)	Medical Device Directive
EN ISO 13485:2012/EN ISO 13485:2012/AC:2012	Medical devices --- Quality management systems --- Requirements for regulatory purposes
EN 60601-1:2014	Medical electrical equipment -- Part 1: General requirements for basic safety and essential performance
EN 60601-1-2:2007	Medical electrical equipment – Part 1-2: Collateral standard: Electromagnetic compatibility – Requirements and tests
EN 60601-1-3:2008	Medical electrical equipment – Part 1-3: Collateral standard: General requirements for radiation protection in diagnostic X ray equipment
EN 60601-2-54:2009	Medical electrical equipment -- Part 2-54: Particular requirements for the basic safety and essential performance of X ray equipment for radiography and radioscopy
EN ISO14971: 2007	Medical device – Application of risk management to medical devices

5.2 Guidance and Manufacture's Declaration for EMC

◆ Electromagnetic emissions

Mars1417V is intended for use in the electromagnetic environment specified below. The user of Mars1417V should assure that it is used in such an environment.

Emission Test	Compliance	Electromagnetic Environment - Guidance
RF emissions CISPR 11	GROUP1	Mars1417V uses RF energy only for its internal function. Therefore, its RF emissions are very low and are not likely to cause any interference in nearby electronic equipment.
RF emissions CISPR 11	Class B	Mars1417V is suitable for use in all establishments, including domestic establishments and those directly connected to the public low-voltage power supply network that supplies buildings used for domestic purposes.
Harmonic emissions IEC 61000-3-2	Class B	
Voltage fluctuations/ flicker emissions IEC 61000-3-3	Pass	

◆ Electromagnetic immunity

Mars1417V is intended for use in the electromagnetic environment specified below. The user of Mars1417V should assure that it is used in such an environment.

Immunity Test	IEC 60601 Test Level	Compliance Level	Electromagnetic Environment - Guidance
Electrostatic discharge (ESD) IEC 61000-4-2	±6 kV contact ±8 kV air	±6 kV contact ±8kV air	Floors should be wood, concrete or ceramic tile. If floors are covered with synthetic material, the relative humidity should be at least 30%.
Electrical fast transient/ burst IEC 61000-4-4	±2 kV for power supply lines ±1 kV for input/ output lines	±2 kV for power supply lines ±1 kV for input/ output lines	Mains power quality should be that of a typical commercial or hospital environment.
Surge IEC 61000-4-5	±1 kV differential mode ±2 kV common mode	±1 kV differential mode ±2 kV common mode	Mains power quality should be that of a typical commercial or hospital environment.
Voltage dips, short interruptions and voltage variations on power supply input lines IEC 61000-4-11	<5% UT (>95% dip in UT) for 0.5 cycle. 40% UT (60% dip in UT) for 5 cycle. 70% UT (30% dip in UT) for 25 cycle. <5% UT (>95% dip in UT) for 5 sec.	<5% UT (>95% dip in UT) for 0.5 cycle. 40% UT (60% dip in UT) for 5 cycle. 70% UT (30% dip in UT) for 25 cycle. <5% UT (>95% dip in UT) for 5 sec.	Mains power quality should be that of a typical commercial or hospital environment. If the user of that requires continued operation during power supply interruptions, it is recommended that be powered from an uninterruptible power supply.
Power frequency (50/60Hz) magnetic field IEC 61000-4-8	3 A/m	3 A/m	Power frequency magnetic fields should be at levels characteristic of a typical location in a typical commercial or hospital environment.

UT is the a.c. mains voltage prior to application of the test level.

◆ Guidance and manufacturer’s declaration----electromagnetic immunity

Mars1417V is intended for use in the electromagnetic environment specified below. The user of Mars1417V should assure that it is used in such an environment.

Immunity Test	IEC 60601 Test Level	Compliance Level	Electromagnetic Environment - Guidance
Conducted RF IEC 61000-4-6	3 Vrms 150kHz to 80MHz	3 Vrms	Portable and mobile RF communications equipment，AC-DC adapter or electromagnet should be used not closer to any part of the Model Mars1417V, including cables, than the recommended separation distance calculated from the equation applicable to the frequency of the transmitter. Recommended separation distance $d = 1,2\sqrt{p}$
Radiated RF IEC 61000-4-3	3 V/m 80MHz to 2.5GHz	3 V/m	

			d = 1,2 $\sqrt{P}$ 80 MHz to 800 MHz d = 2,3 $\sqrt{P}$ 800 MHz to 2,5 GHz Where P is the maximum output power rating of the transmitter in watts (W) according to the transmitter manufacturer and d is the recommended separation distance in meters (m). Field strengths from fixed RF transmitters, as determined by an electromagnetic site survey, should be less than the compliance level in each frequency range. Interference may occur in the vicinity of equipment marked with the following symbol:

NOTE: UT is the a.c. mains voltage prior to application of the test level.

NOTE1 At 80 MHz and 800 MHz, the higher frequency range applies.

NOTE2 These guidelines may not apply in all situations. Electromagnetic propagation is affected by absorption and reflection from structures, objects and people.

a. Field strengths from fixed transmitters, such as base stations for radio (cellular/cordless) telephones and land mobile radios, amateur radio, AM and FM radio broadcast and TV broadcast cannot be predicted theoretically with accuracy. To assess the electromagnetic environment due to fixed RF transmitters, an electromagnetic site survey should be considered. If the measured field strength in the location in which Mars1417V is used exceeds the applicable RF compliance level above, Mars1417V should be observed to verify normal operation. If abnormal performance is observed, additional measures may be necessary, such as re-orienting or relocating Mars1417V.

b. Over the frequency range 150 kHz to 80 MHz, field strengths should be less than [V1] V/m.

- Recommended separation distances between portable or mobile RF communications equipment and Mars1417V

Mars1417V is intended for use in an electromagnetic environment in which radiated RF disturbances are controlled. The customer or user of Mars1417V can help prevent electromagnetic interference by maintaining a minimum distance between portable or mobile RF communications equipment (transmitters) and Mars1417V as recommended below, according to the maximum output power of the communications equipment.

Rated maximum	Separation distance according to frequency of transmitter /m

output power of transmitter /W	150kHz~80 MHz $d = 1.2\sqrt{p}$	80 MHz~800 MHz $d = 1.2\sqrt{p}$	800 MHz ~2.5GHz $d = 2.3\sqrt{p}$
0.01	0.12	0.12	0.23
0.1	0.38	0.38	0.73
1	1.2	1.2	2.3
10	3.8	3.8	7.3
100	12	12	23

For transmitters rated at a maximum output power not listed above, the recommended separation distance d in meters (m) can be estimated using the equation applicable to the frequency of the transmitter, where P is the maximum output power rating of the transmitter in watts (W) according to the transmitter manufacturer.

NOTE 1 At 80 MHz and 800 MHz, the separation distance for the higher frequency range applies.

NOTE 2 These guidelines may not apply in all situations. Electromagnetic propagation is affected by absorption and reflection from structures, objects and people.

◆ Cables information below is provided for EMC reference.

Cable	Recommended cable length	Shielded or Unshielded	Number	Cable classification
AC Power Cable	3m	Unshielded	1 pcs	AC Power
Ethernet Cable	3.5m	Shielded	1 pcs	Signal
DC Power Cable	3.5m	Unshielded	1 pcs	DC Power
LAN Cable	3m	Shielded	1 pcs	Signal

◆ Important information regarding Electromagnetic Compatibility (EMC)

Mars1417V requires special precautions regarding EMC and needs to be installed only by iRay or authorized personnel and put into service according to EMC information provided in the user manual. Mars1417V in use may be susceptible to electromagnetic interference from portable and mobile RF communications such as mobile (cellular) telephones. Electromagnetic interference may result in incorrect operation of the system and create a potentially unsafe situation.

Mars1417V conforms to this EN60601-1-2:2007 standard for both immunity and emissions.

Nevertheless, special precautions need to be observed:

The use of accessories, transmitters and cables other than those specified by this User Manual, with the exception of accessories and cables sold by iRay of Mars1417V as replacement parts for inner components, may result in increased emission or decreased immunity.

5.3 Radio Frequency Compliance Information

Country	Item
U.S.A	FCC Part 15.107 Sub part (b) / 15.109(g) Sub part B FCC Part 15 Sub part E 15.407 FCC Part 15 Sub part C 15.247
European Union	ETSI EN 301 489-1 V1.8.1 (EMC) ETSI EN 301 489-17 V2.1.1 (EMC) EN 300 328 V.1.7.1; EN 301 893 V1.6.1 (RF) EN 62311:2008 (RF Exposure) ETSI EN 300 328 V1.7.1; EN 301 893, V1.5.1 (Radio Spectrum)

5.3.1 FCC Compliance

- The panel has been tested to comply with limits for a Class B digital device, pursuant to part 15 of FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation.
- Operation is subject to the following two conditions.

  The panel may not cause harmful interference.

  The panel must accept any interference received, including interference that may cause undesired operation.
- The panel generates, uses, and radiates radio frequency energy and, if not installed and used in accordance with the instruction, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If the panel does cause

harmful interference to radio or television reception, which can be determined by turning the panel off and on, the user is encouraged to correct the interference by one or more of the following measure.

Reorient or relocate the antenna.

Increase the separation between the panel and receiver.

Connect the panel into an outlet different from the receiver is connected.

Consult the distributor or an experienced radio/TV technician for help.

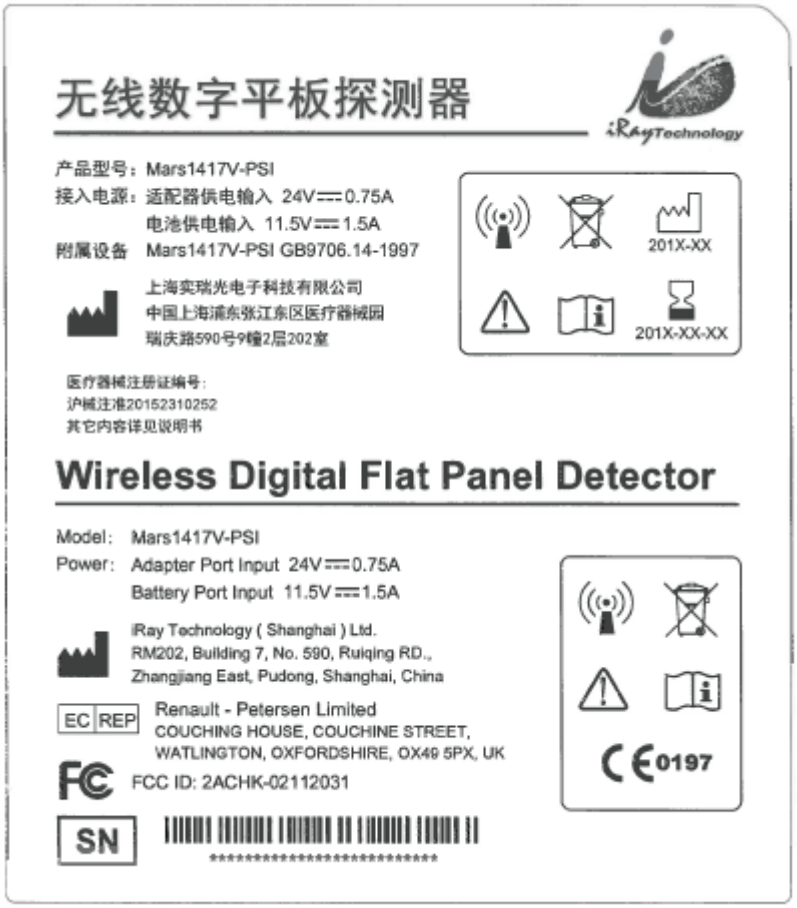
5.4 Battery Safety Standards

Standards	Description
UL1642	Component Recognition on the Secondary Li-ion cell
UL 2054:2004 R9.11	Household and commercial Batteries
IEC 62133:2012	Secondary cells and batteries containing alkaline or other non-acid electrolytes
UN38.3	United Nations Recommendations on the Transport of dangerous goods Manual of tests and Criteria ST/SG/AC.10/11/Rev.5/Amend.1&Amend.2

5.5 Product Label

5.5.1 Detector

Mars1417V-PSI detector



Mars1417V-TSI detector

无线数字平板探测器
产品型号：Mars1417V-TSI
接入电源：适配器供电输入 24V⎓0.75A
电池供电输入 11.5V⎓1.5A
附属设备 Mars1417V-TSI GB9706.14-1997
上海奕瑞光电子科技有限公司
中国上海浦东张江东区医疗器械园
瑞庆路590号9幢2层202室
201X-XX
201X-XX-XX
医疗器械注册证编号：
沪械注准20152310251
其它内容详见说明书
Wireless Digital Flat Panel Detector
Model: Mars1417V-TSI
Power: Adapter Port Input 24V⎓0.75A
Battery Port Input 11.5V⎓1.5A
iRay Technology (Shanghai) Ltd.
RM202, Building 7, No. 590, Ruiqing RD.,
Zhangjiang East, Pudong, Shanghai, China
EC REP
Renault - Petersen Limited
COUCHING HOUSE, COUCHINE STREET,
WATLINGTON, OXFORDSHIRE, OX49 5PX, UK
FC
FCC ID: 2ACHK-02112031
SN
CE 0197

5.5.2 Battery

锂离子充电电池
产品型号： BATTERY-KV
输 出： 10.8V ⎓ 4180mAh/45.14Wh
充电电压： 12.6V
执行标准： GB/T18287-2013
识 别 码： 3ICP8/116/211
上海奕瑞光电子科技有限公司
中国上海浦东张江东区医疗器械园
201X-XX 瑞庆路500号9幢2层202室
警告!
注意火灾、爆炸危险，禁止灼烧或浸入水中；
不可短接、不可存放于高于45℃的环境或有意自拆解；
请使用CHARGER-KV为电池充电，请勿使用其他型号充电器；
请在初次使用时请为电池完全充电；
当电池电量小于5%时，请及时将电池充电；
请用同型号电池替代，使用不同型号电池有损伤或有爆炸危险；
请将电池放置在儿童无法触及的地方；
请根据当地法律处理废旧电池。
Lithium ion Rechargeable Battery Pack
Model: BATTERY-KV
Output: 10.8V ⎓ 4180mAh/45.14Wh
Charge Voltage: 12.6V
Standard: GB/T18287-2013
Identification code: 3ICP8/116/211
iRay Technology (Shanghai) Ltd.,
RM202, Building 7, No.590, Ruiqing RD.,
201X-XX Zhangjiang East, Pudong, Shanghai, China
EC REP Renault - Petersen Limited
COUCHING HOUSE, COUCHINE STREET,
WATLINGTON, OXFORDSHIRE, OX49 5PX, UK
CAUTION
Risk of fire, explosion, burning or put into water
Do not short circuit, crush or expose battery in the environment above 45℃, incinerate or disassemble the battery
Charge only with CHARGER-KV
Please charge the battery before first use
Please charge the battery immediately when the capacity is less than 5%
Replace battery with same part number only. Use another battery may present a risk of fire or explosion
Keep away from children
Dispose of all used batteries according to local law
SN

5.5.3 Battery Charger

6 Trouble Shooting

When user encounters problems or error messages, refer to this chapter. If the problem persists, turn off the panel and contact iRay service department (**service@iraychina.com**). We would provide the best service.

6.1 Cable Inspection

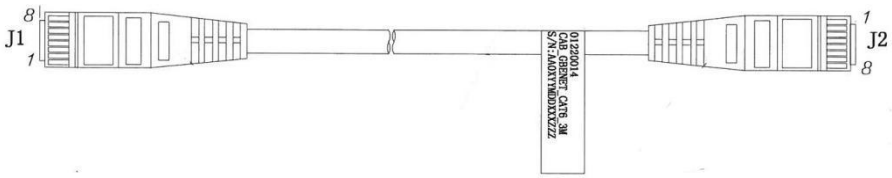
6.1.1 Ethernet Cable

6.1.1.1 Inspection Method

Test the Gigabit Ethernet cable by cable tester and confirm whether all the cores of cable are conductive. If the cable tester is not available, please check the definition of Gigabit Ethernet cable and test the conductive between each pin of connector.

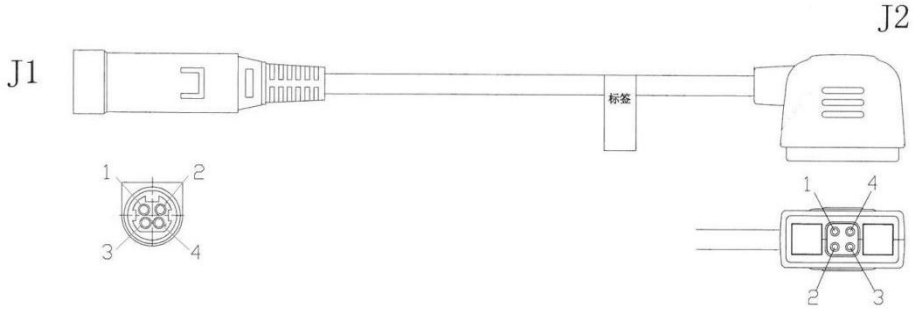
6.1.1.2 Definition of Gigabit Ethernet Cable

Colour	J1	J2
Orange\White	1	3
Orange	2	6
Green\White	3	1
Blue	4	7
Blue\White	5	8
Green	6	2
Brown\White	7	4
Brown	8	5
Grounding wire	Shell	Shell



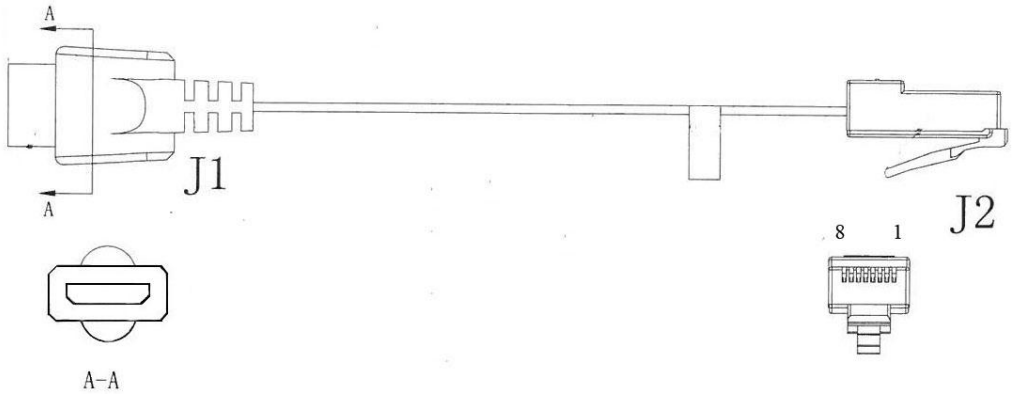
6.1.1.3 Power Cable Inspection

J1	J2
3	1
	3
2	2
	4



Measure the conductive between each pin of J1 and J2 by multi-meter.

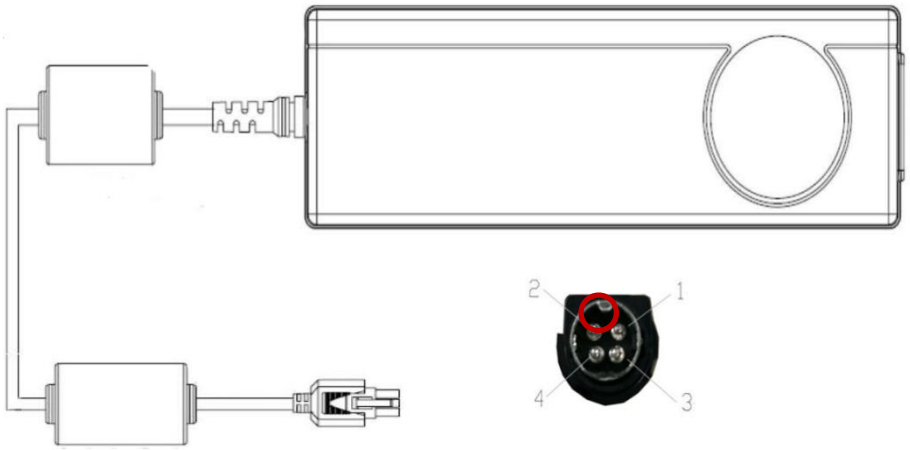
6.1.2 Ethernet Cable Inspection



According to the definition of Ethernet cable, verify the conductive between each pin of J1 and J2 by multi-meter.

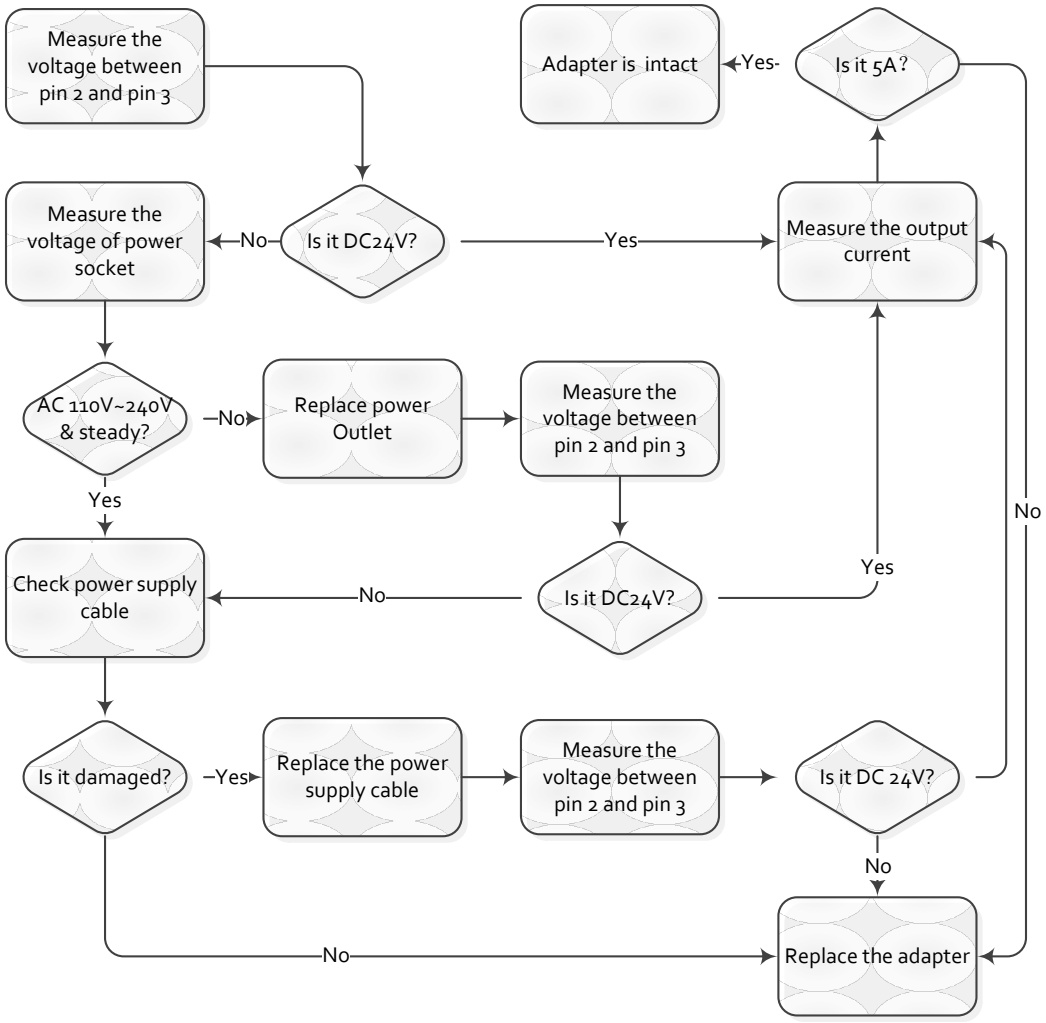
6.2 Adapter Inspection

6.2.1 Adapter Connector Definition



Pin	Description
2	DC +24V/5.0A
3	0V

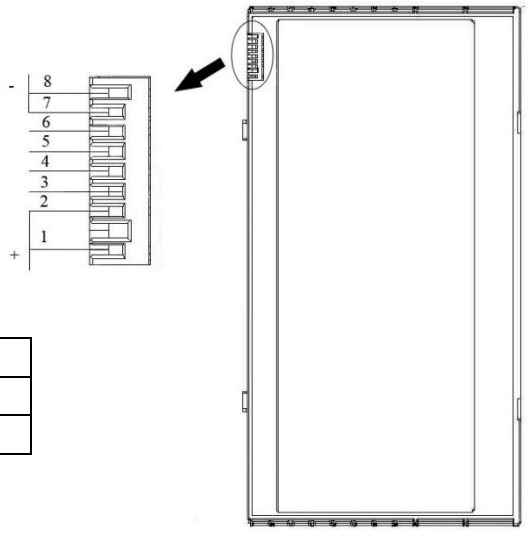
6.2.2 Inspection Method



Connect the adapter to the panel or battery charger to confirm whether the battery is working if verifying the output current is not practicable.

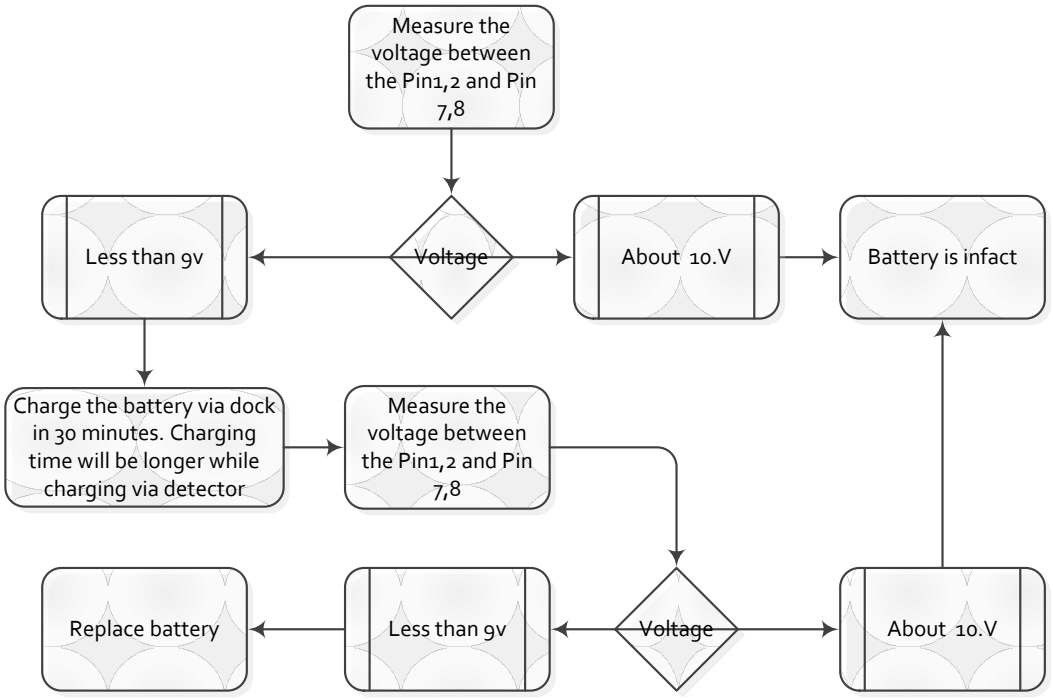
6.3 Battery Inspection

6.3.1 Battery Pin Definition



Pin	Symbol	Description
1,2	P+	Battery Discharge Positive Terminal
7,8	P-	Battery Discharge Negative Terminal

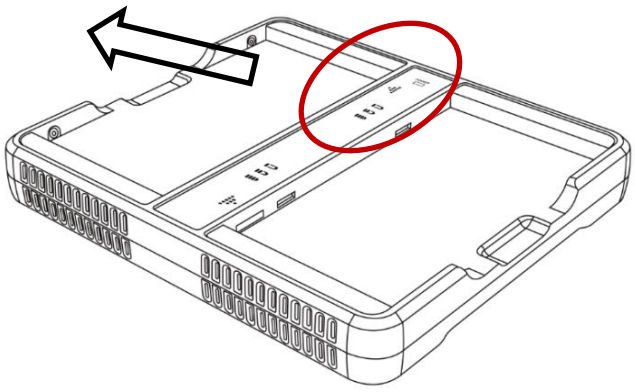
6.3.2 Inspect Method



The battery is detachable and its life time is shortened during use. Recycle the battery if fully charged battery only last no more than 1 hour. It is suggested to return wasted battery to manufacturer or put it at appointed public battery reclaim area. Do not mix battery with other waste or dispose of battery.

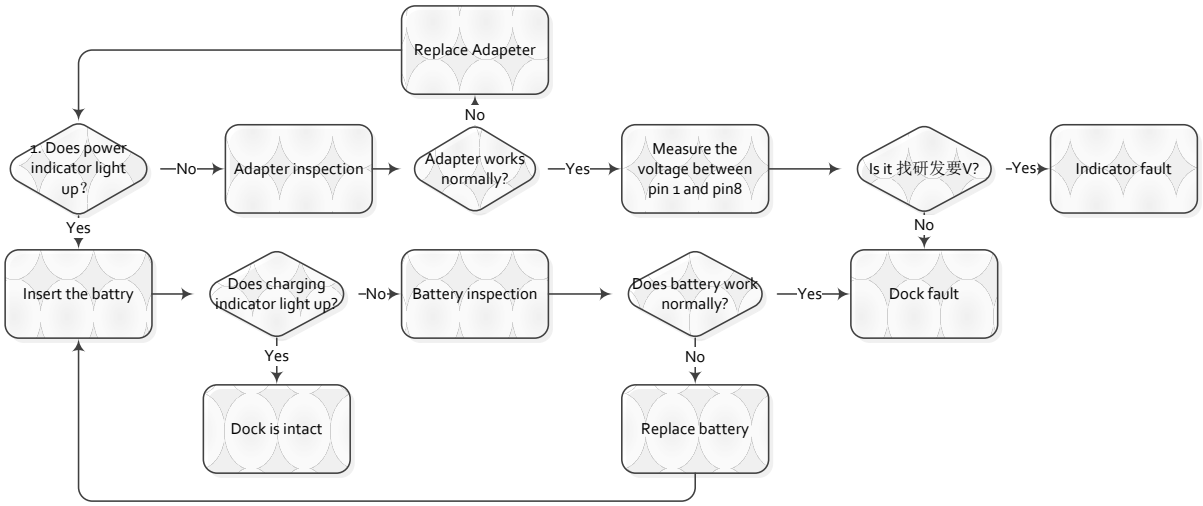
6.4 Charger Inspection

6.4.1 Charger Pin Definition



Pin	Voltage	Description
1,2	+	Battery Charge Positive Terminal
7,8	-	Battery Charge Negative Terminal

6.4.2 Inspection Method

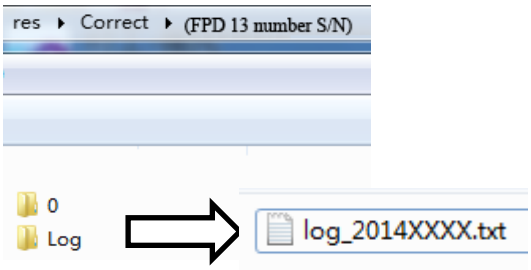


6.5 Detector Main Unit Inspection

6.5.1 Get SDK and Detector Log

6.5.1.1 Fetch SDK Log

Find the location of iDemo.exe, and there is a folder called “Correct” in the same directory. Find the folder named by the series number of detector. The folder called “Log” is the storage path of SDK fie, and log file is named with date. Please compress the log file before send it.



The log function can be switched on in the config.ini in the folder named “Res”, please check the configuration before start iDemo.

SET_LOG_INFO=1//Open log function’

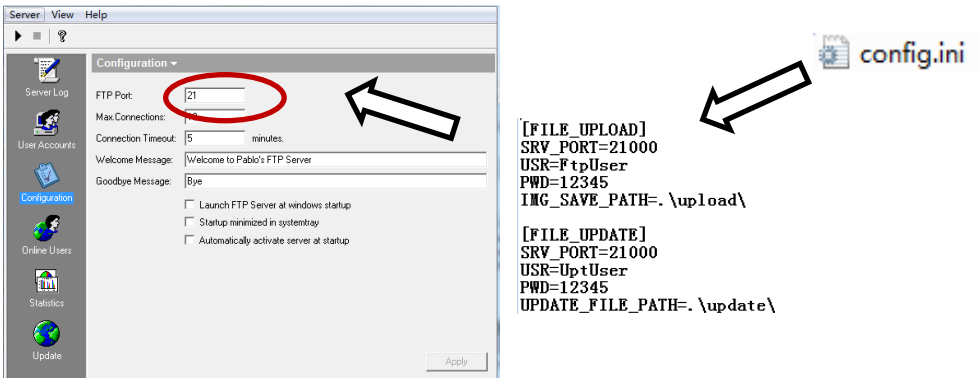
SET_LOG_INFO=0//Close log function

```
// *** log *** //
SET_LOG_INFO=1
```

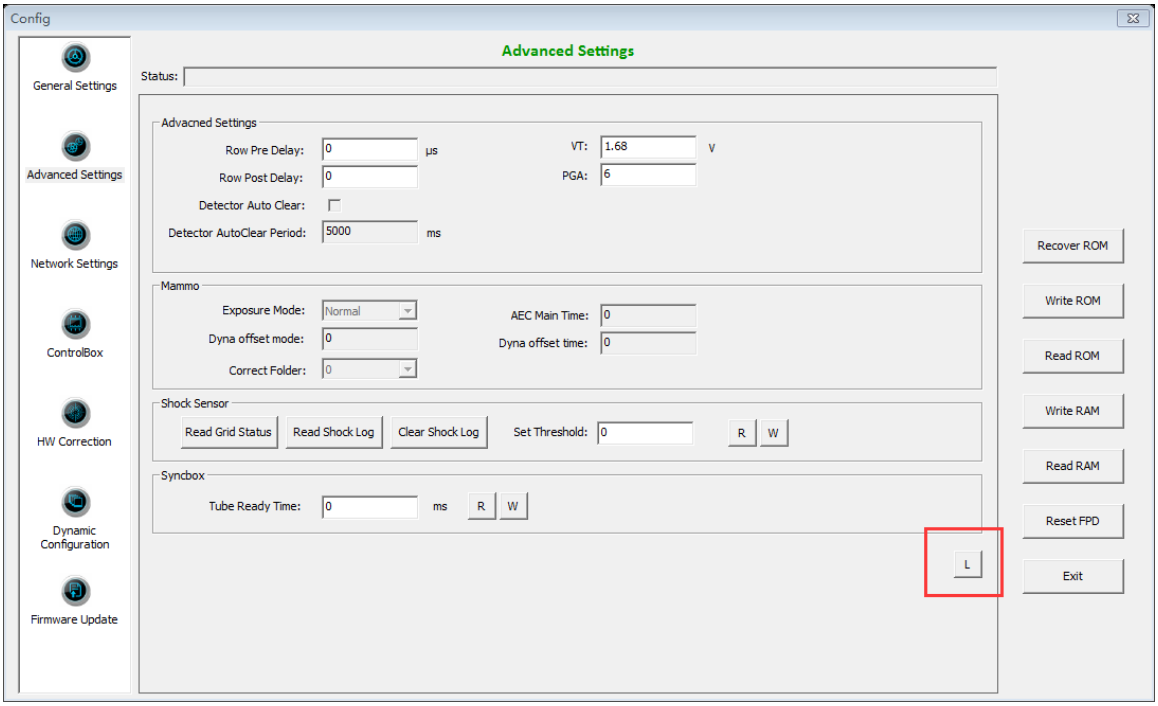
6.5.1.2 Detector Log

Find FTP Server.exe

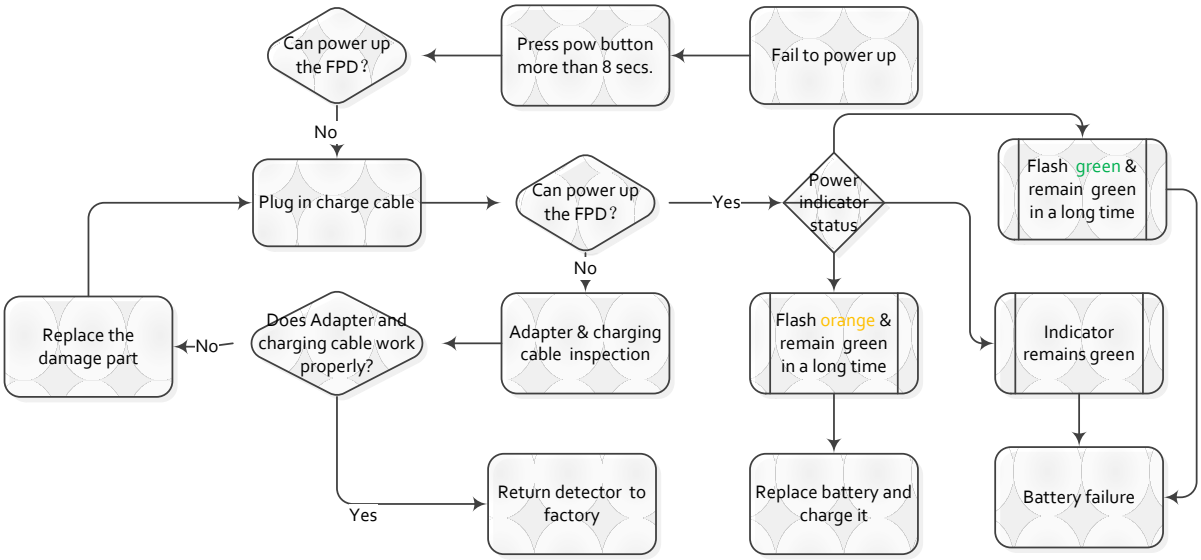
and open the FTP Server, FTP port number should be the same as the config.ini of iDemo. Click button to start FTP server.



Find the “L” button in the following diagram in the configuration GUI of iDemo, click “L” button and the FTP will upload the “Log” in the storage path “upload\[FPD series number]\logs”.



6.6 Power Up Failure Inspection

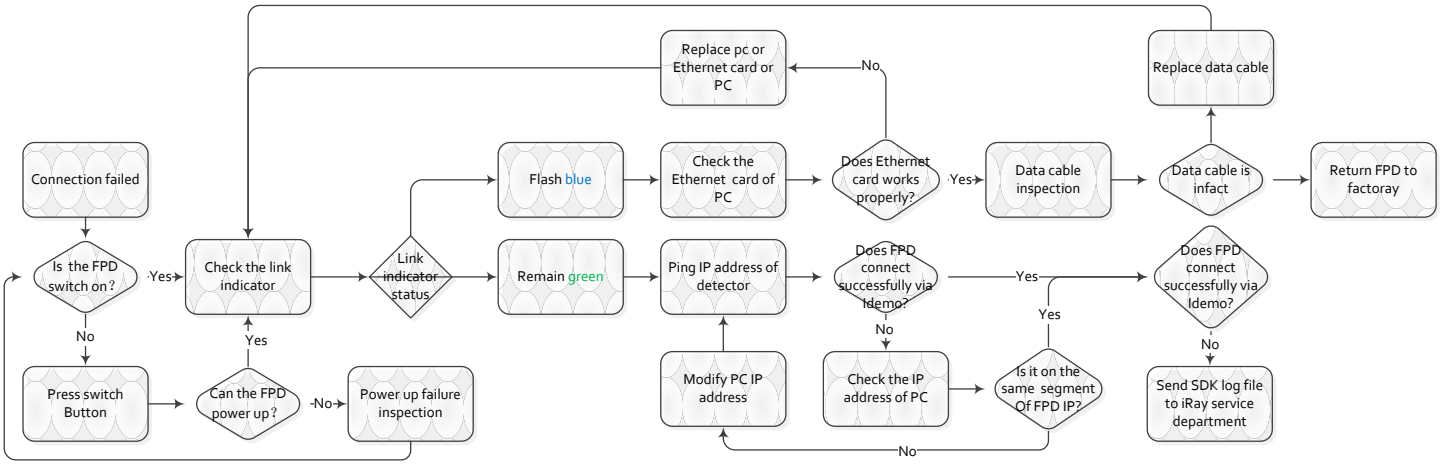


 is the label of power indicator. Skip the step “Press reset button” if no reset button, because the previous version doesn’t include reset button.

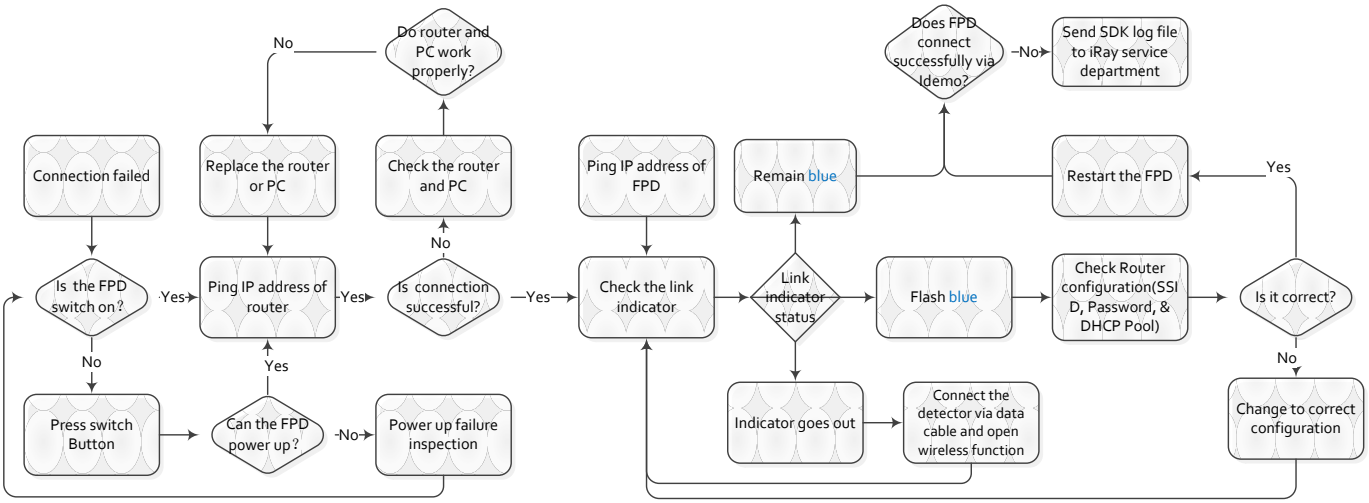
6.7 Connection Inspection

 is label of link indicator. If there is connection error from iRayDR, please view the FAQ of iRay before checking the connection issue through iDemo.

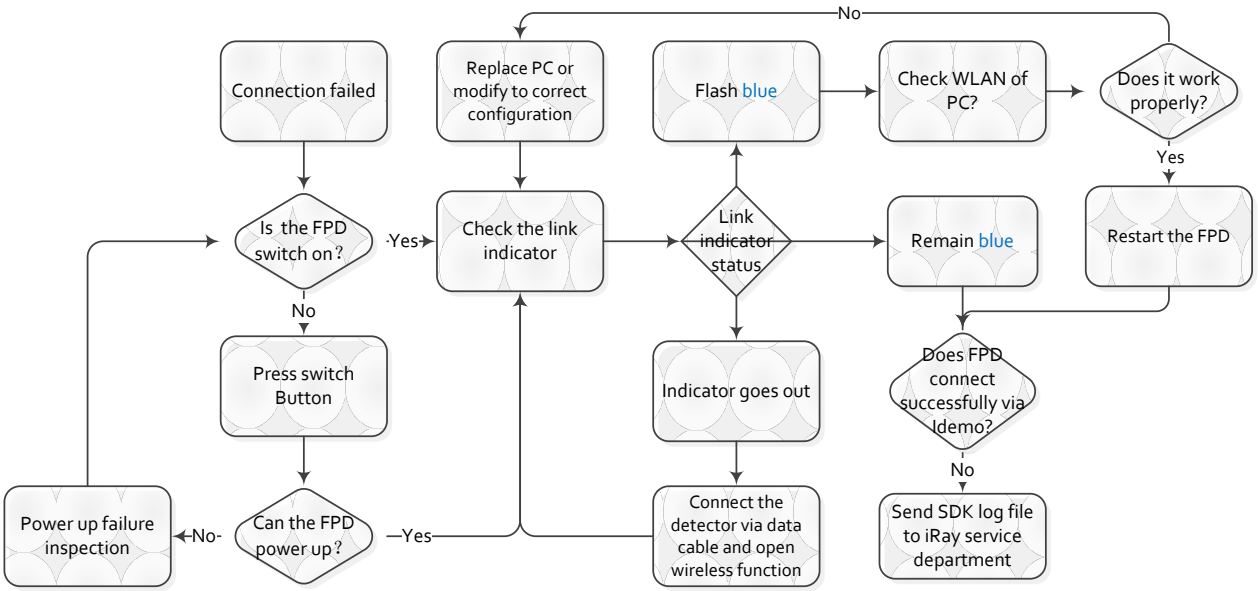
6.7.1 Connection Failed in Wired Mode



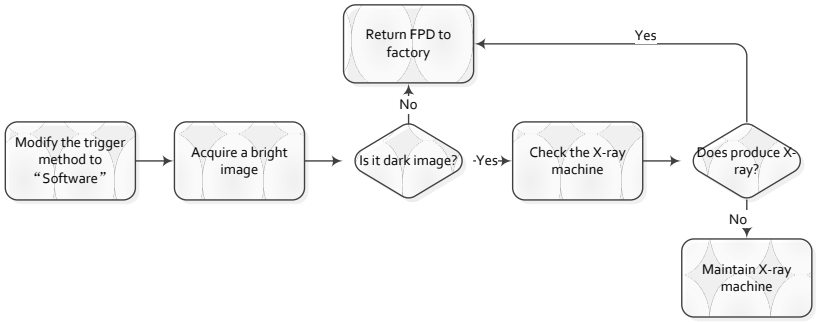
6.7.2 Connection Failed in Client Mode



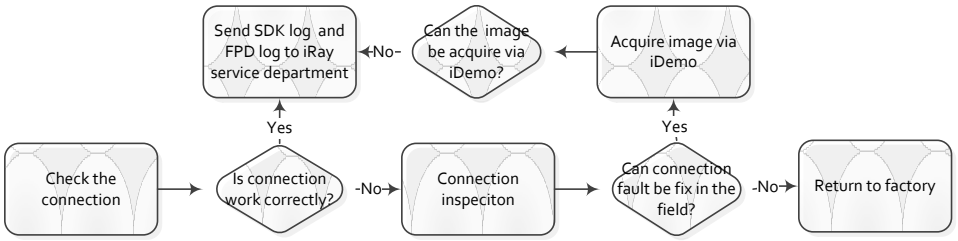
6.7.3 Disconnect in AP mode



6.8 Dark Image Acquisition After Exposure in Inner Mode



6.9 No Image Acquire After Exposure



6.10 Image Inspection

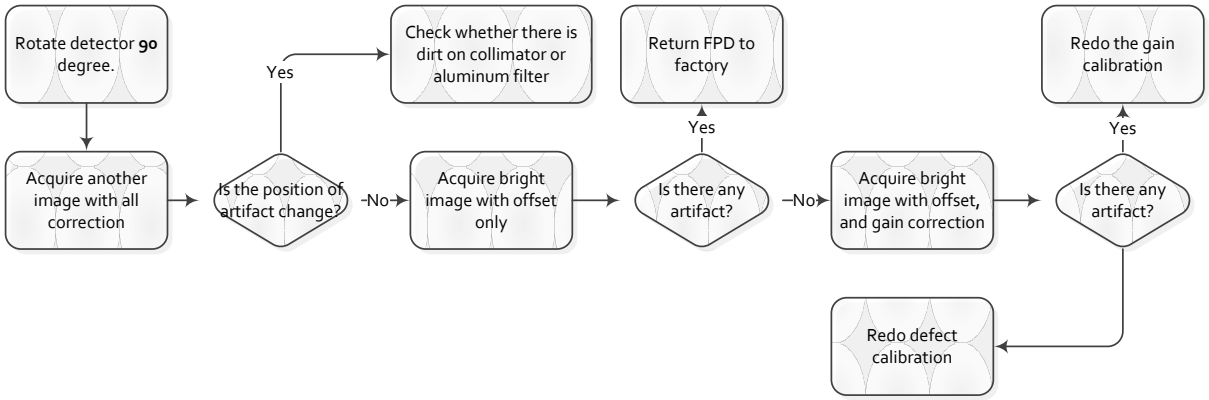
All the correction files are in the storage path "res\Correct\ [FPD series number] \0"

Calibration type	File format	Description
Offset	*.off	Offset file is used in pre-offset mode
Gain	*.gn	The gain file can be selected or deselected
Defect	*.dft	The gain file can be selected or deselected
Lag	*.lag	Lag file is used in Isync Plus mode

The following is the image

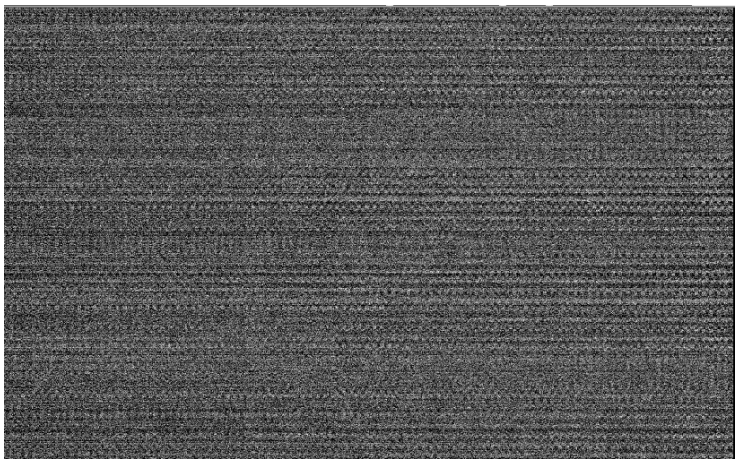
Image type	Description
Original dark image	Acquire by clicking "Prep Acquire" button without exposure and offset correction
Dark image	Acquire by clicking "Prep Acquire" button without exposure, but with offset calibration.
Original bright image	Acquire the image under exposure condition, but without any correction.
Bright image with offset	Acquire the image under exposure condition and with offset correction only.

6.10.1 Artifact on bright image

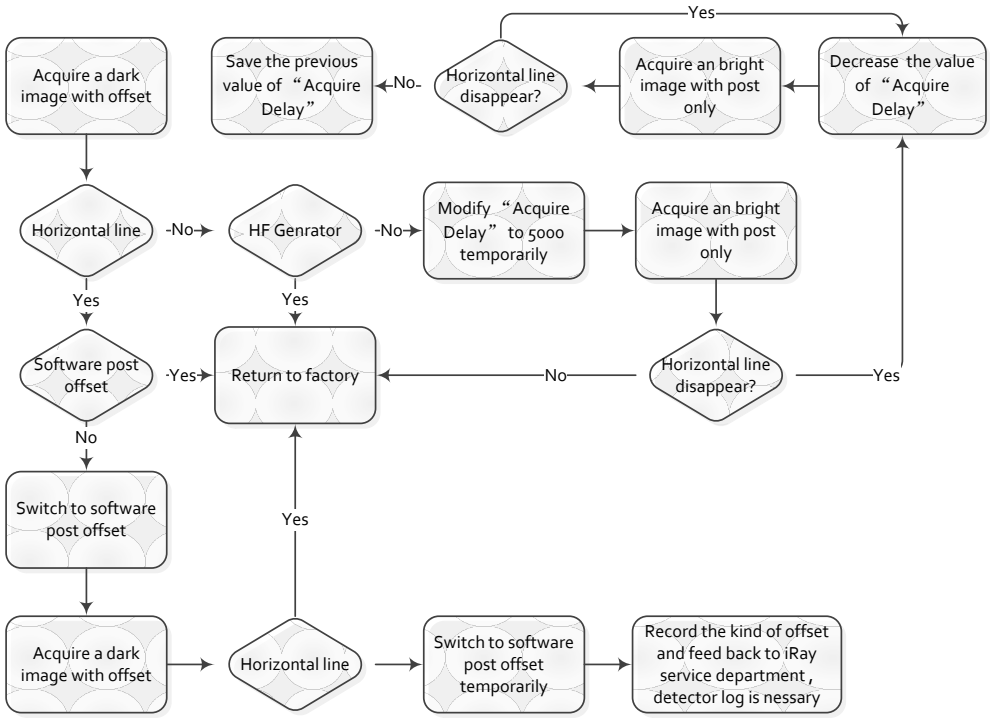


6.10.2 Horizontal Line on Bright Image

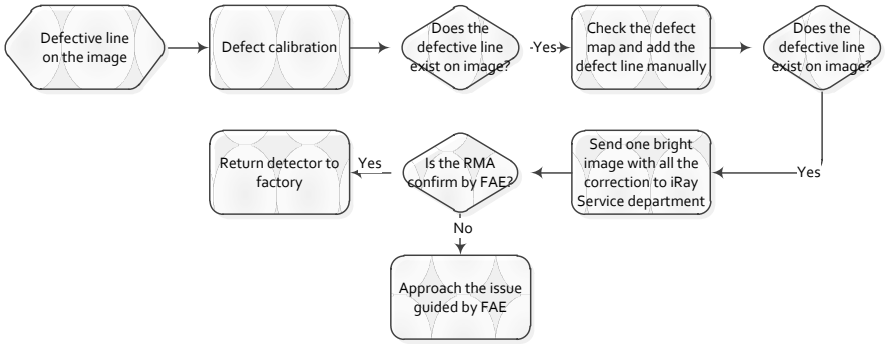
Adjust the WW to 30 and WL to 100 through iDemo for checking the horizontal line of dark image.



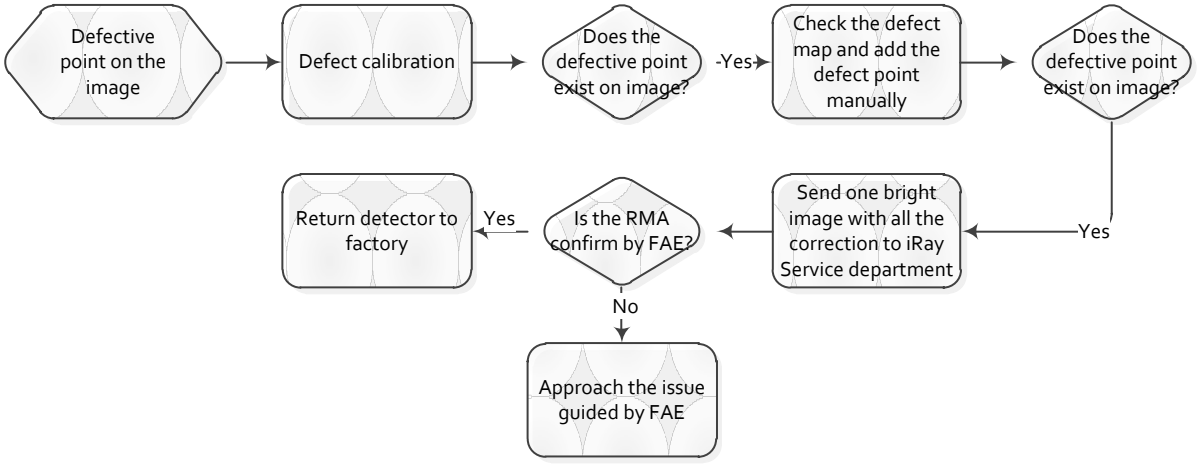
Inspection method



6.10.3 Defect Line

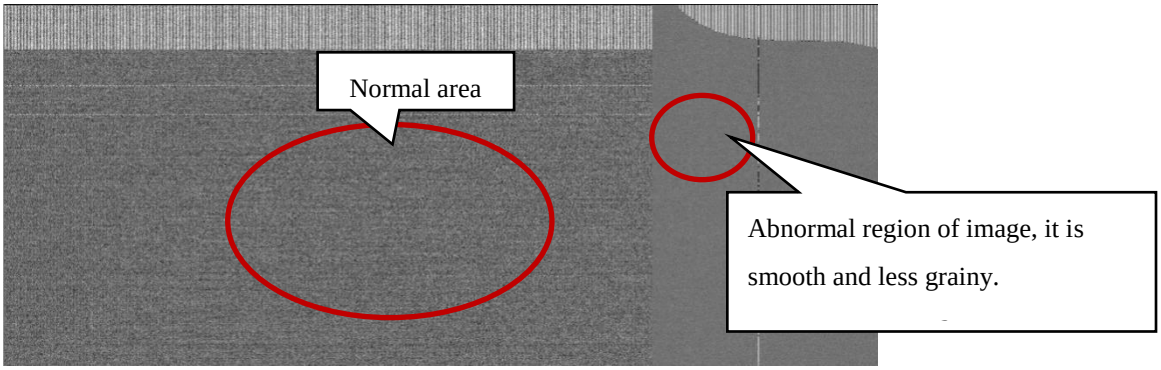


6.10.4 Defective point



6.10.5 TFT broken

If image of some area is much smoother than other area. TFT Glass must be broken by intense impact.



7 Service Information

7.1 Product Lifetime

The estimated product lifetime is up to 10 years under appropriate regular inspection and maintenance.

7.2 Regular Inspection and Maintenance

In order to ensure the safety of patients and operator, to maintain the performance and reliability of the panel, be sure to perform regular inspection at least once a year. If necessary, clean up the panel, make adjustments or replace consumables such as fuses etc. There may be cases where overhaul is recommended depending on conditions. Contact iRay service office or local iRay dealer for regular inspection or maintenance.

7.3 Repair

If problem cannot be solved even taking the measures indicated in troubleshooting, contact your sales representative or local iRay dealer for repairs. Please refer to thelabel and provide the following information:

Product Name:

Series Number:

Description of Problem: as clearly as possible.

7.4 Replacement Parts Support

Main parts (parts required to maintain the function of the product) of this product will be stocked for 5 years after discontinuance of production for repairing.