Wireless Digital Flat Panel Detector

Mars1717V

User Manual

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CE 0197

Before operating, please read this user manual and pay attention to all safety precautions.

Please ensure that this user's manual is properly maintained so that it can be accessed at any time (reserve).

Please use it correctly on the basis of full understanding of the content.

E

Congratulations on your purchase of the Fixed Digital Flat Panel (hereinafter referred to as Mars1717V) which is manufactured by iRay Technology Co.Ltd. (Hereinafter referred to as iRay).

At iRay, we strive to not only make the world-class products that deliver the best value possible to our customers but also offer the highest quality of service and customer care. Please take time to read through this user guide in order to utilize the product effectively. We hope you enjoy the experience with iRay Mars1717V （configuration：Mars1717V2 ）.

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

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Location: 2F, Building 9, No.590, Ruiqing Rd, Pudong, Shanghai,

Notes on usage and management of the equipment

Read all of the instructions in the user guide before your operation. Give particular attention to all safety precautions.

Only a physician or a legally certified operator should use this product.

The equipment should be maintained in a safe and operable condition by maintenance personnel.

Use only 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 only the dedicated cables. Do not use any cables other than those supplied with this product.

Request your sales representative or local iRay dealer to install this 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 the environment. Some countries or regions, such as the European Union, have set up systems to collect and recycle electrical or electronic waste items. Contact your local authorities for information about practices established in your region. If collection systems are not available, call iRay Customer Service for assistance.

Disclaimer

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

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

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 iRay Products by iRay Technology.

It is the responsibilities of the user/attending physicians for maintaining the privacy of image data and providing 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.

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

Copyright

Trademarks

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

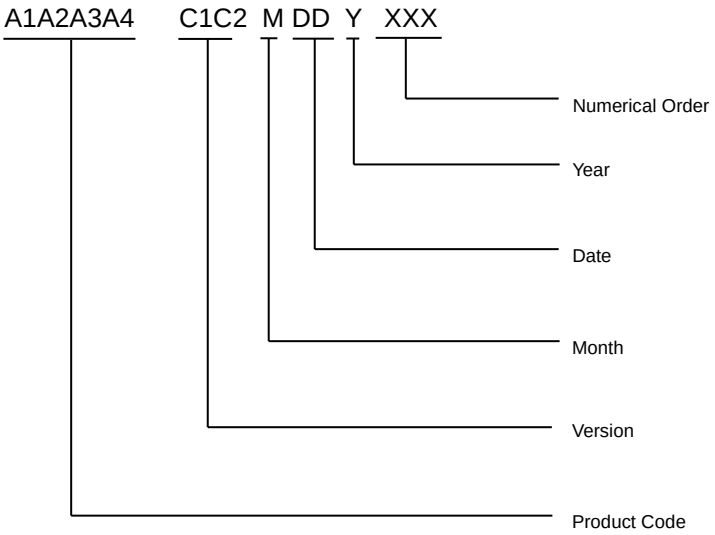
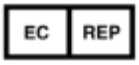
Symbols and Conventions

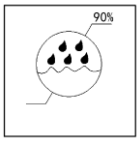
The following symbols and conventions are used throughout the user guide.

	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.

Labels and markings on the equipment

The contents of the labels and markings on iRay Mars1717V2 product are indicated below:

Diagram	Connotation
	Caution: please refer to the instructions in the user manual.
	This symbol is used to indicate that the equipment has passed CE testing and it is followed by the CE number.
	This symbol is used to identify the manufactuer's 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 is used to indicate the name and address of the manufacturer.
	This symbol is used to indicate the name and address of iRay authorized representative in the European region.
	This symbol is used to indicate consultation of the user guide for general information.
	Safety Signs: please refer to the user guide for safety instructions.
	Safety Signs：Dangerous Voltage.
	Stand-by.

	Handled with care.
	This symbol is used to indicate the operational temperature limits.
	Package symbol, fragile.
	Package symbol, keep away from sunlight.
	Package symbol, keep dry.
	Package symbol, this symbol is used to indicate the humidity limits.
	Package symbol, keep the equipment up right.
	Package symbol, do not roll the transportation package.
	Package symbol, this symbol is used to indicate stacking limit number.
	Protective grounding.

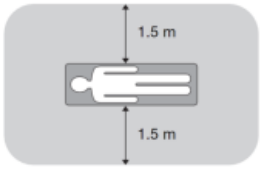
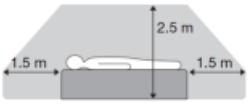
1. Safety

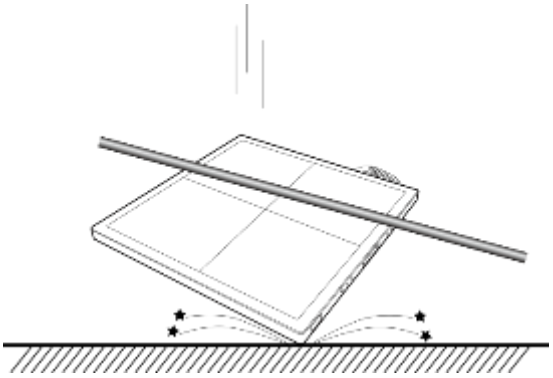
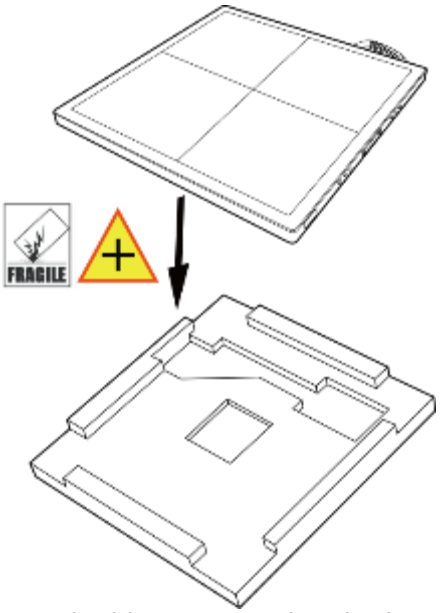
1.1 Safety precautions

Follow these safeguards and properly use the equipment to prevent injury and damage to any equipment/data.

WARNING	
Installation and environment of use   	• **Do not use or store the equipment near flammable chemicals such as alcohol, thinner, benzene, etc.** If chemicals are spilled or evaporate, it may result in fire or electric shock through contact with electric parts inside the equipment. Also, some disinfectants are flammable. Be sure to take care when using them. • **Do not connect the equipment with anything other than specified.** Doing so may result in fire or electric shock. • **All the patients with active implantable medical devices should be kept away from the equipment.**
Power supply  	• **Do not operate the equipment using any type of power supply other than the one indicated on the rating label.** Otherwise, it may result in fire or electric shock. • **Do not handle the equipment with wet hands.** You may experience electric shock that could result in death or serious injury. • **Do not place heavy object such as medical equipment 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 equipment using the same AC outlet.** Doing so may result in fire or electric shock. • **Do not turn ON the system power when condensation has formed on the equipment.** Doing so may result in fire or electric shock. • **Do not connect a multiple portable socket-outlet or extension cord to the system.** Doing so may result in fire or electric shock. • **To avoid the risk of electric shock, this equipment 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 the exposed metal prongs of the plug, fire or electric shock may result. • **Be sure to turn OFF the power to each piece of equipment 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 equipment. No modification of this equipment is allowed. Parts of the VENU1717MN that are not serviced or maintained while in use with the patient.** Doing so may result in fire or electric shock. Also, since the equipment 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 equipment.** The object may fall and cause an injury. Also, if metal objects such as needles or clips fall into the equipment, or if liquid is spilled, it may result in fire or electric shock. • **Do not hit or drop the equipment.** The equipment may be damaged if it receives a strong jolt, which may result in fire or electric shock if the equipment is used without being repaired. • **Do not put the equipment and pointed objects together.** The equipment may be damaged. If so, the equipment 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 of the equipment.
When a problem occurs	• **Should any of the following occurs, immediately unplug the power cord of Control Box, 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 equipment has been dropped and damaged.
Maintenance and inspection  	• **Please turn OFF the power of the equipment and unplug the power cord of adaptor before cleaning.** • **NEVER use alcohol, ether and other flammable cleaning agent for safety. NEVER use methanol, benzene, acid and base because they will erode the equipment.** • **DON'T dip the equipment into the liquid.** • **Please make sure that the equipment's 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 to each piece of equipment when performing inspections indicated in this manual.** Otherwise, electric shocks may occur.

CAUTION	
Installation and environment of use	• **Do not install the equipment in any of the locations listed below. Doing so may result in failure, malfunction, equipment 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 equipment or injury of the user due to tripping over the cable.  
Power supply	• **Always connect the 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 equipment to an indoor grounded connector. Also, be sure to connect all the grounds for the system to a common ground.** • **Do not use any power source other than the one provided with this equipment.** Otherwise, fire or electric shock may be caused due to leakage.
Handling	• **Do not spill liquid or chemicals onto the equipment. In case the patient is injured, it is not allowed to contact with blood or other body fluids.** Doing so may result in fire or electric shock. In such a situation, protect the equipment with a disposable cover as necessary. • **Turn OFF the power and pull out the plug to each piece of equipment for safety when not used.**

CAUTION	
Handling	• **Handle the equipment carefully.** • **Do not submerge the equipment in water.** • **The internal image sensor may be damaged if something hits against it or it is dropped.**  • **Do not place excessive weight on the equipment.** • **Be sure to use the equipment on a protected foam. Otherwise, the internal image sensor may be damaged. Be sure to securely hold the detector while using it in upright positions. Otherwise, the detector may fall over, resulting in injury to the user or patient, or may flip over, resulting in damage to the inner device.**  Keep the same load (same pressure) on the detector when acquiring the image. Or 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**

1.2 Notes for Using

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

Before exposure

- Be sure to check the equipment daily and confirm that it works properly.
- Sudden heating of the room in cold areas will cause condensation to form on the equipment. In this case, wait until the condensation evaporates before performing an exposure. If the equipment is used while condensation is formed on it, problems may occur in the quality of captured images. When an air-conditioner is used, be sure to raise/lower the temperature gradually so that a difference of temperature in the room and equipment does not occur, to prevent condensation.
- The detector should warm up for 15 minutes before exposure or updating the gain map or defect map.

During exposure

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

Disinfection and Cleaning (When in portable usage)

- After every examination, wipe the patient contact surfaces of the detector using disinfectants such as ethanol, to prevent the risk of infection. For details on how to sterilize, consult a specialist.
- Do not spray the detector directly with disinfectants or detergents.
- Wipe it with a cloth slightly damped with a neutral detergent. Do not use solvents such as alcohol, thinner, benzene, acid and base. Doing so may damage the surface of the equipment.
- It's recommended to use a waterproof non-woven cover as the isolated layer between detector and the blooding patient.

Replace Cables

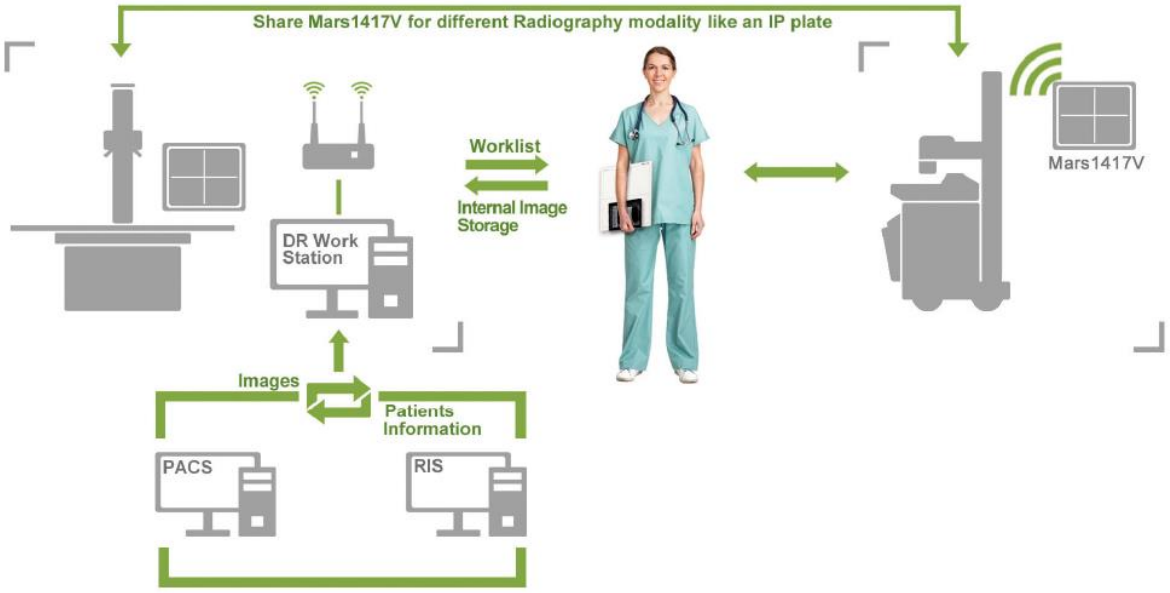
- Turn OFF the power of the equipment and unplug the power cord from the AC outlet before operation. Unplug the Detector cable from the float outlet, or it may result in fire or electric shock.
- Eliminate the static before replacing cable, including operating platform, tools and operator, or ESD may damage the detector.

2. General Description

Mars1717V（configuration：Mars1717V2, hereinafter referred as Mars1717V） 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 3072×3072 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 Mars1717V supports wireless communication between panel and Workstation. Mars1717V's power supply includes battery. Mars1717V can be used as a real portable panel.

2.1 Scope

This manual contains information about the Mars1717V. 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

Mars □ □ □

- PSI- GOS Model, VSI- CsI Model
- Product Application：Cassette size portable detector
- Product dimension：1717，17inch×17inch
- Product series：Wireless digital flat panel detector series

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/ essential performance/ application specification

2.4.1 Intended use

Mars1717V Wireless Digital Flat Panel Detector is indicated for digital imaging solution designed for providing general radiographic diagnosis of human anatomy. It is intended to replace radiographic film/screen systems in all general-purpose diagnostic procedures. 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 detector.

iRay would provide hardware and software support for integration of system.

This panel is not intended for mammography or dental applications.

2.5 Essential performance

According to the Mars1717V series intended use and the result of risk management, getting imaging and function of data transmission is defined as essential performance.

Getting qualified dark image proves that essential performance does not influence intended use. Method for getting dark image in detail refers to section “install” and “operation”

2.5.1 Application specification

PATIENT population:

Weight: not relevant

Health: not relevant

Nationality: multiple

Patient state: patient is not user

Gender: except for pregnant women

Intended OPERATOR:

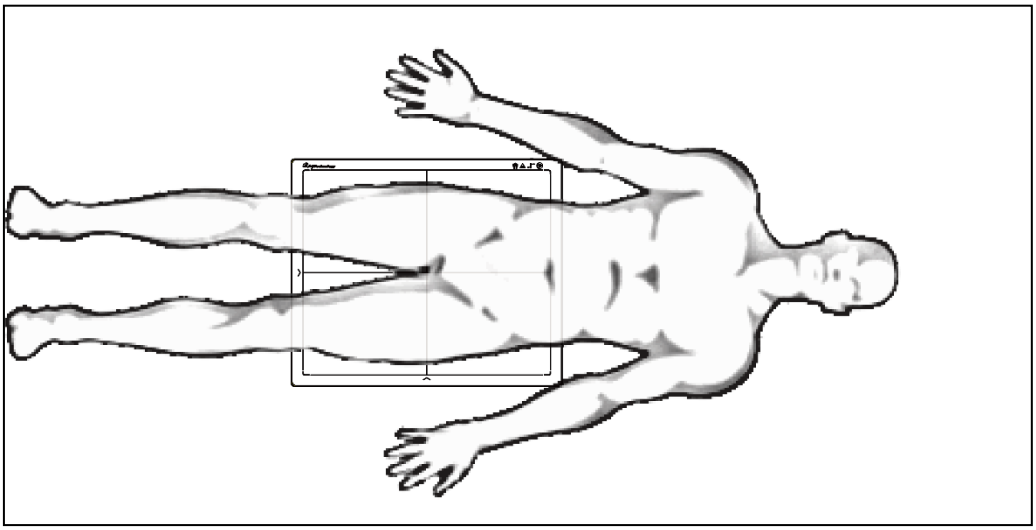
All of use, maintenance and operation steps should be carried out by the operator who has accepted the professional training offered by the company's customer service staff.

Life-time:

Life-time: 5 years without frequency limit

2.6 The relative position between patient and detector

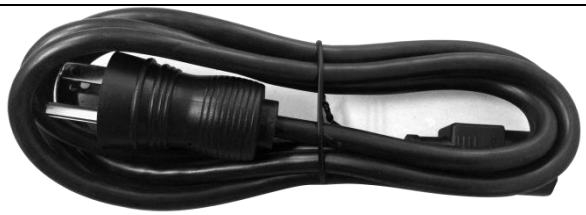
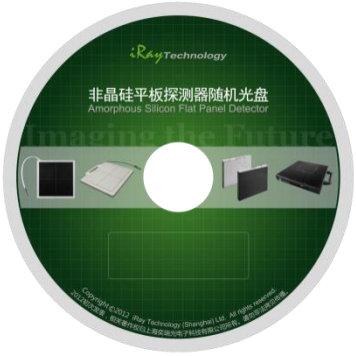
Because of the crosstalk effect of Amorphous silicon flat-panel detector, Pay attention to the relative position of patient and detector, the recommended position as shown below, Otherwise, the image is prone to abnormal light lines.



2.7 Product Components

Mars1717V comes with both DC power supply and battery package. Once powered on, it would build a connection with Workstation through Ethernet cable (only for service) or Wireless connection.

Item		Description
Mars1717V Detector		1pcs Main Unit
Medical Adapter for • Detector and • Battery Charger		1 pcs DC 24V
Battery		2 pcs Battery pack
Ethernet Cable (Only for service)		1pcs 3.5 m

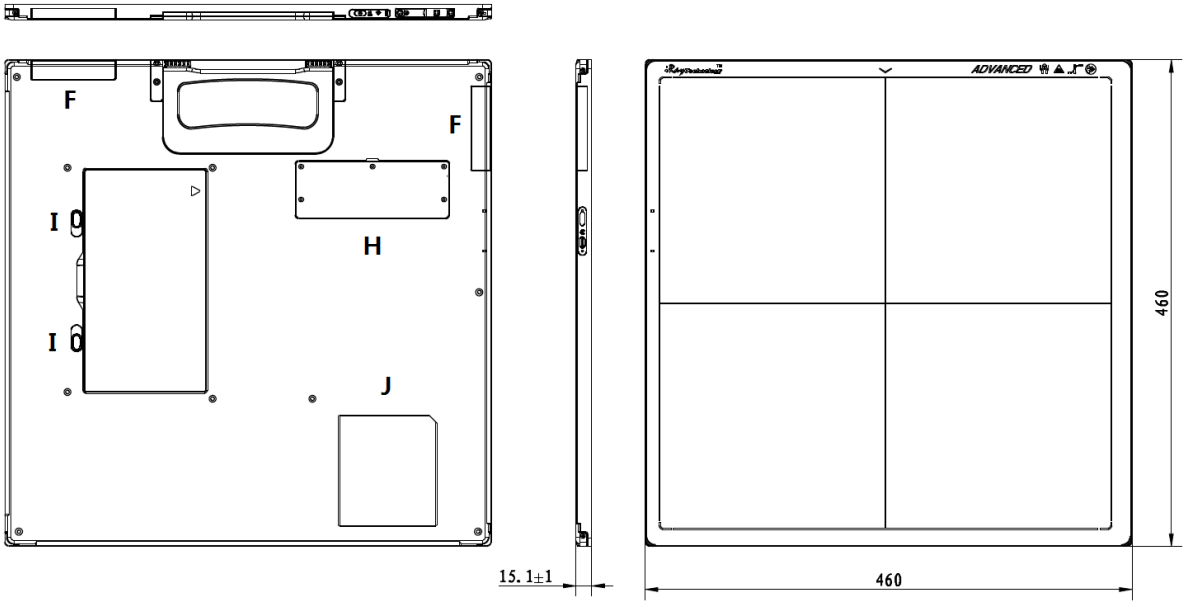
Gigabit Ethernet Cable		1pcs 3 m
AC Power Cable		1 pcs
DC Power Cable		1 pcs 3.5 m
Battery Charger		1pcs
CD-Rom		1pcs Gain correction data Defect correction map SDK Manual

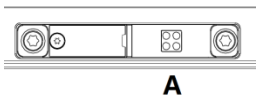
2.8 Optional Product Component

	Item	Description
Wireless AP Device		1pcs
Infrared Device		1pcs

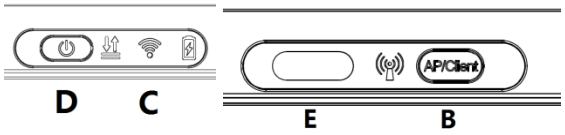
2.9 Components Description

2.9.1 Detector





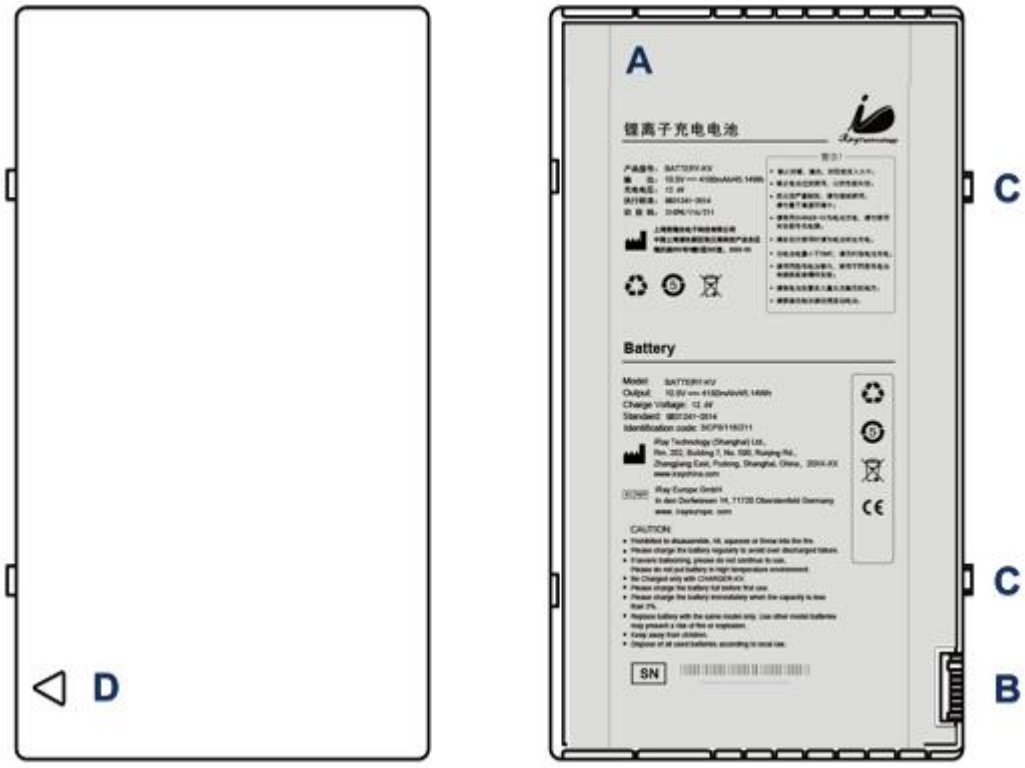
ExternalSignals Input



Control Panel

Item	Name	Description
A	DC Jack	24V DC input
B	AP/Client	Change the work mode for wireless connection
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
H	Maintenance Cover	For service engineer to maintenance
I	Battery Lock	The lock button for detaching battery
J	Detector Label	Product information.

2.9.2 Battery

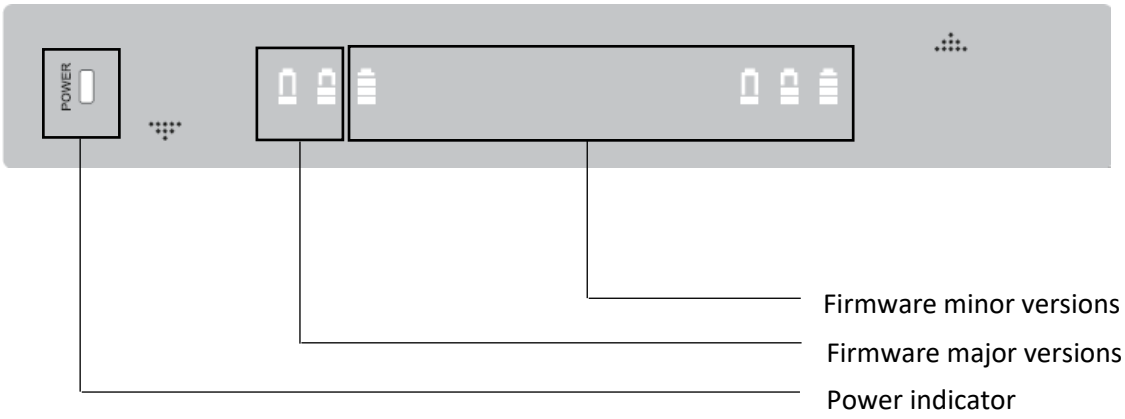


Item	Name	Description
A	Battery Label	/
B	Battery Interface	8 Pin Battery connector
C	Pilot Pin	/
D	Indicator	Installation direction indicator

2.9.3 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

Firmware versions definition



Firmware versions	Lighting Status	Value range (BCD)
Major		00-11
Minor		0000-1111

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
I, II and III blinking		Battery enter into 2nd level protection, automatic unlock with safety condition

2.9.3.1 Power Supply

Mars1717V supports both DC Power and Battery package input.

2.9.3.2 Infrared Device

Mars1717V does not include Infrared Device. User can choose by them; however some basic requirements should be followed.

2.10 Product Specification

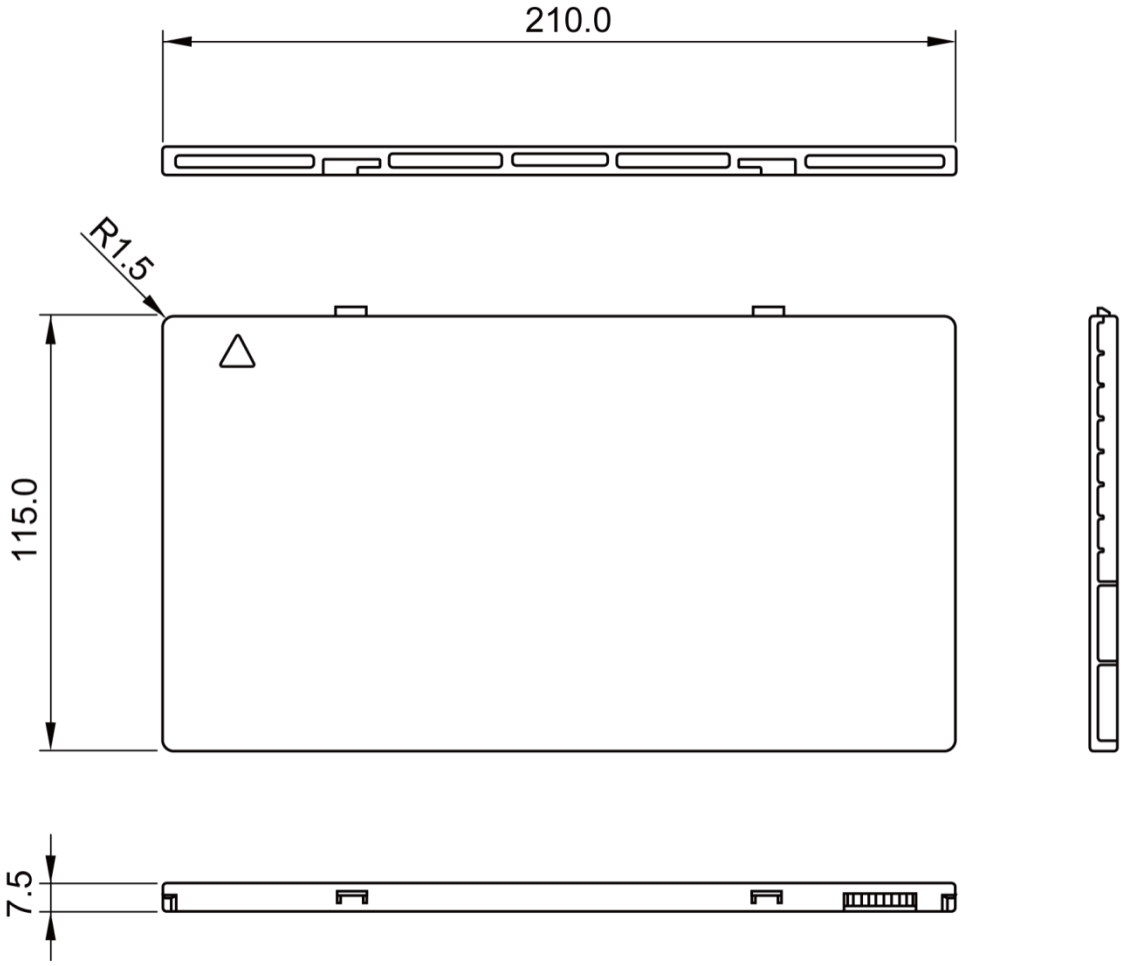
2.10.1 Detector

2.10.1.1 Basic

Item	Specification
Model	Mars1717V-PSI (GOS) Mars1717V-TSI (CsI)
Image Sensor	a-Si (Amorphous Silicon) TFT
Pixel Size	139μm
Effective Array	3072 x 3072
Effective Area (H x V)	427mm x 427mm
Gray scales	14bit

Spatial Resolution	3.6 Lp/mm
Image Acquisition Time (Wireless) Both AP mode and Client mode	Preview Acquisition Time : 3 sec. Processed Acquisition Time : 7 sec. (including Preview Time)
Cycle Time	Min. 12s
Power Consumption	Max. 15W
Dimension (L × W × H)	460 x 460 x 15.2 mm
Weight (with one battery)	Mars1717V-PSI: 4.45 kg without battery, 4.67 kg with battery Mars1717V-VSI: 4.65 kg without battery, 4.87 kg with battery
Image Transfer	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

2.10.2 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-10℃-+40℃
Storage Temperature	1 month-20℃-+50℃ 3 month -20℃-+40℃

	6 month -20℃-+20℃
Relative Humidity	65±20%
Dimension (L × W × H)	210 x 115 x 7.5 mm
Weight	0.22kg

2.10.3 Battery Charger

Item	Specifications
Model	Charger-KV
Simultaneous Charging	2 battery packs
Full charging time	2.5 hours
Rated power supply	24V(DC)
Dimension (L × W × H)	300 x 263 x 42 mm
Weight	1.26 kg

2.10.4 Power supply

Mars1717V supports both DC Power and Battery package input.

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

2.10.5 Infrared Device (Optional)

Mars1717V does not include Infrared Device. User can choose by themself, 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

2.10.6 AP Router (Optional)

Mars1717V 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)

2.10.7 Wireless Communication

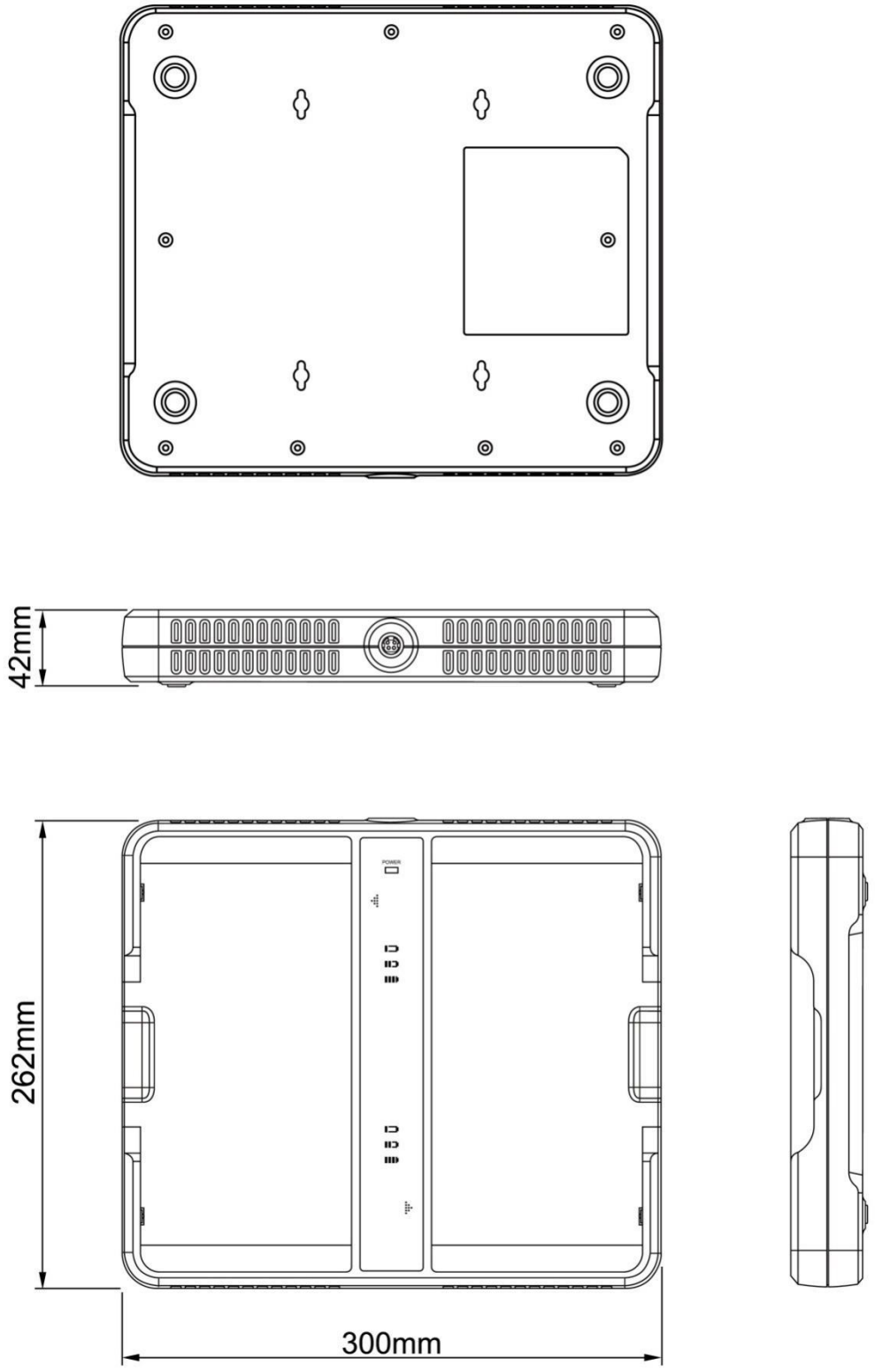
Item	Description
Wireless Standard	IEEE802.1a/b/g/n
Frequency Range	2.4G: 2.412 ~ 2.4835 GHz 11: (Ch. 1-11) – United States 13: (Ch. 1-13) – Europe 14: (Ch. 1-14) – Japan 5G: 5.15 ~ 5.85 GHz 12: United States 19: Europe 8: Japan
Data Transmission Rate	802.11b : Max. 11Mbps

	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

2.10.8 Recommended Application Condition

Item	Description
Operating System	Windows XP/7 32/64bit
CPU	Intel Core i7 3.6G
Memory	4G DDR3
Hard Disk	640 G
LAN Card	Intel Pro EXP9301CT PRO Gigabit Network Adapter with PCIe interface

2.10.9 Mechanical Outlines


42mm
262mm
300mm

2.10.10 Use Environment

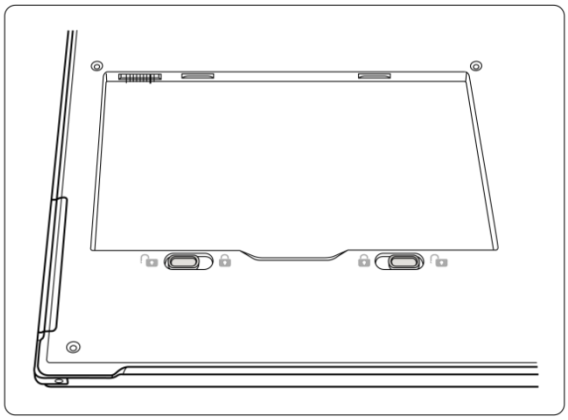
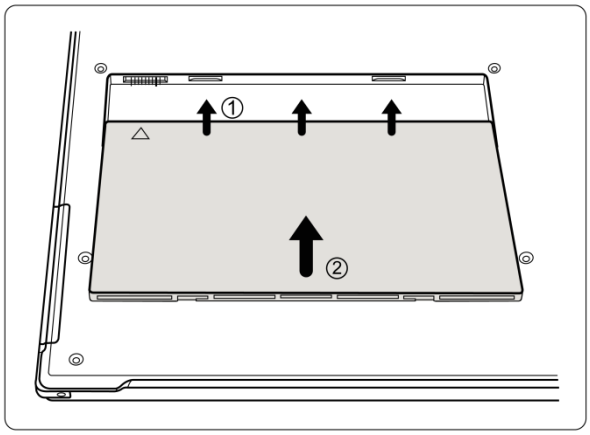
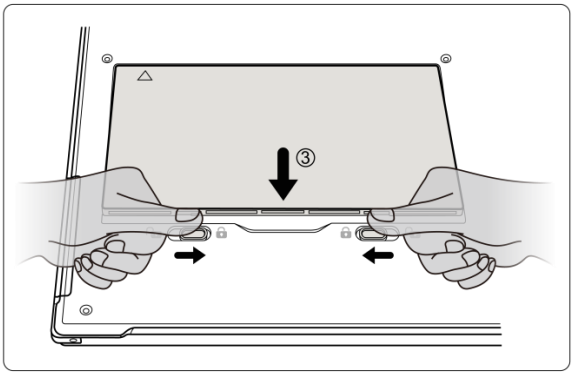
	Temperature	Temperature change	Humidity	Atmospheric Pressure	Pressure Change
Operating	5~30℃	<1k/min	30%~75% RH	700~1060hPa	<10kp/min (1kp=1.0197E-5Pa)
Storage	-10~40℃	<1k/min	10%~90% RH	700~1060hPa	<10kp/min (1kp=1.0197E-5Pa)
The Mars1717V serial detectors shall operate at an altitude specified not more than 3000m, the environment is only for detector.					

3. Installation

3.1 Panel Installation

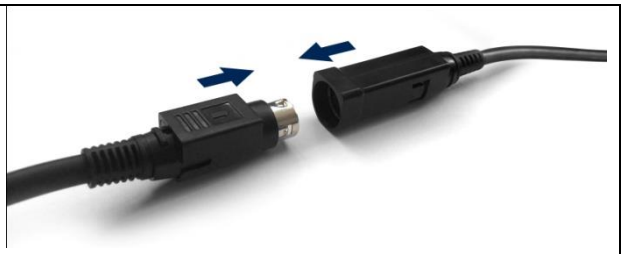
3.1.1.1 Attach Battery Pack

Mars1717V 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, Mars1717V 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.	

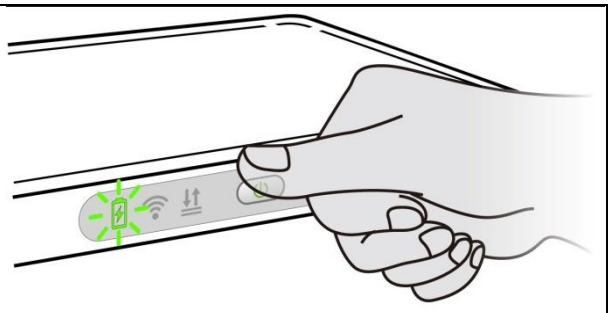
3.1.1.2 Attach DC Power

Please see below for DC power installation.

Connect one end of DC Power Cable to the Medical Adapter	
As figure is power interface Ethernet interface	
Connect another end of DC Power Cable to the DC input of the detector.	

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

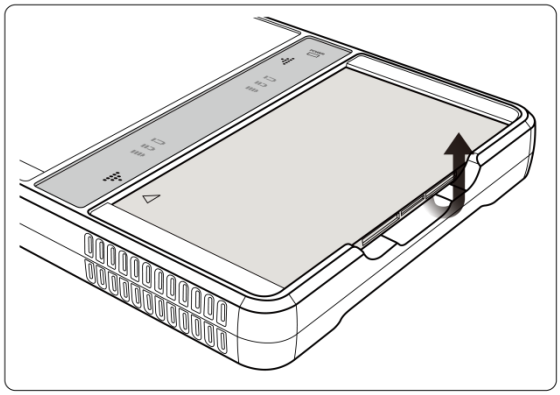
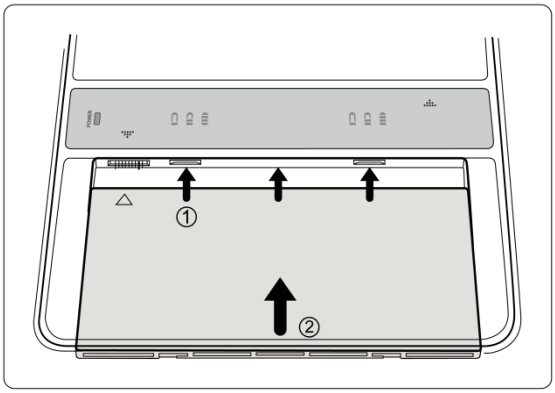
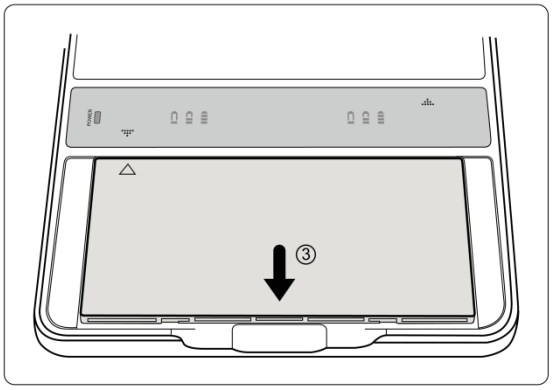
OFF		• Shut down • wired connection broken and wireless connection not ready
Blue blinking		• Client mode, wireless connection is ready, but not connected
Blue ON		• Client mode, wireless connection is built • AP mode, wireless AP is ready
Green ON		• Wired Connection is built
Green blinking		• Panel 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.	

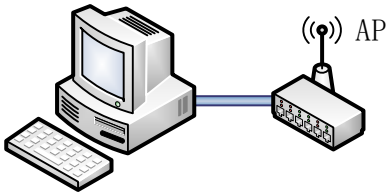
3.3 Software Installation

In the case of iDetector not work, please install Microsoft .NET Framework 4.5 first，then install vcredist_x86_2013（or vcredist_x64_vs2013）.(iDetector should not be used for terminal hospital)

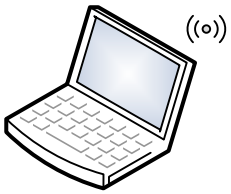
3.4 Panel Infrastructure

Mars1717V supports two connection modes as follows, the IP address and other information mentioned below is as the example, user should configure the connection with the specific requirement.

1) Wireless Client Mode



2) Wireless AP Mode

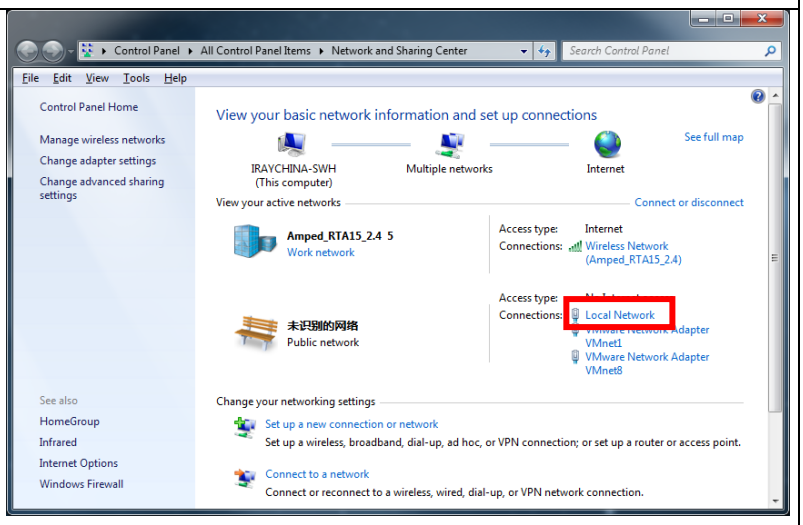


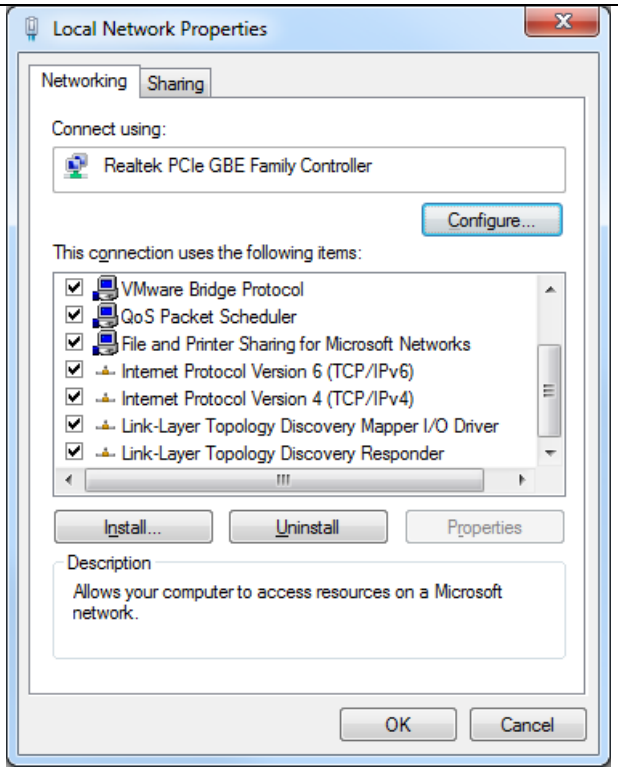
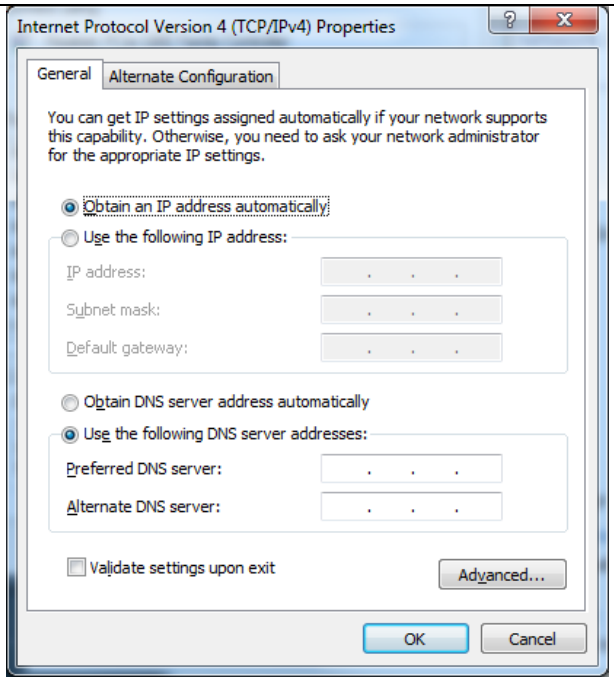
To build connection between workstation and Panel, User should follow steps below.

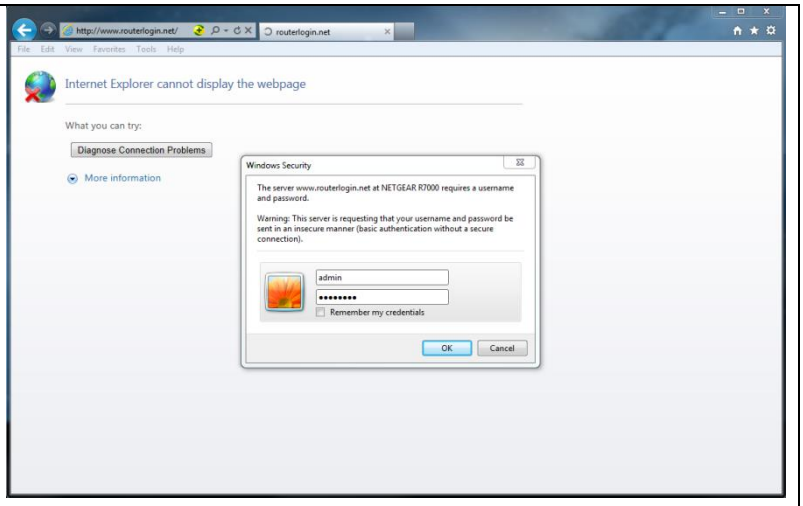
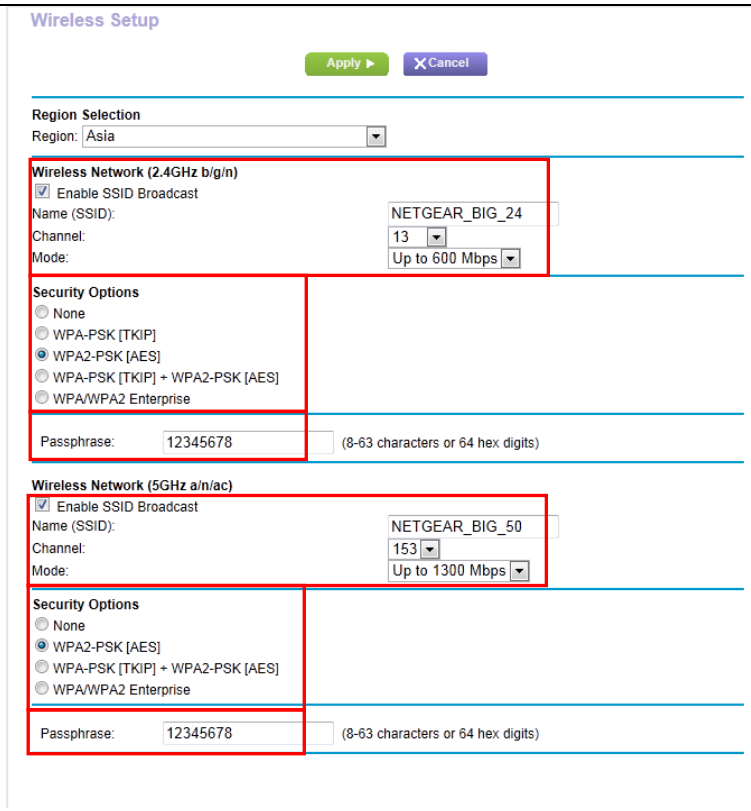
3.4.1.2 Wireless Client Mode

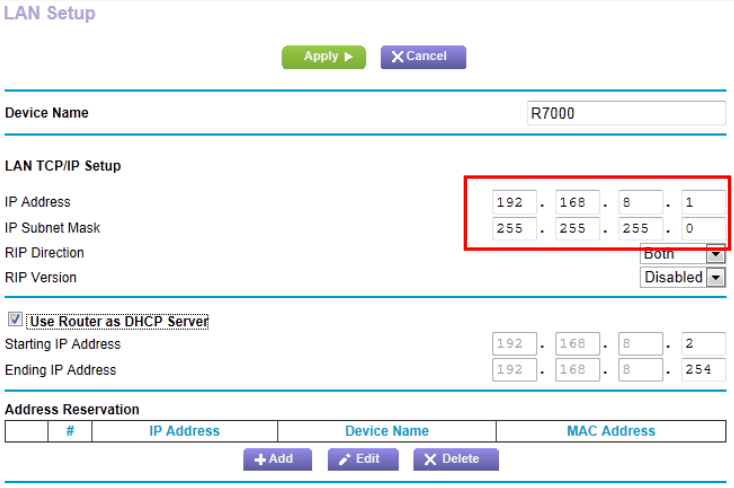
To complete Wireless Client mode configuration, user has to finish actions listed below.

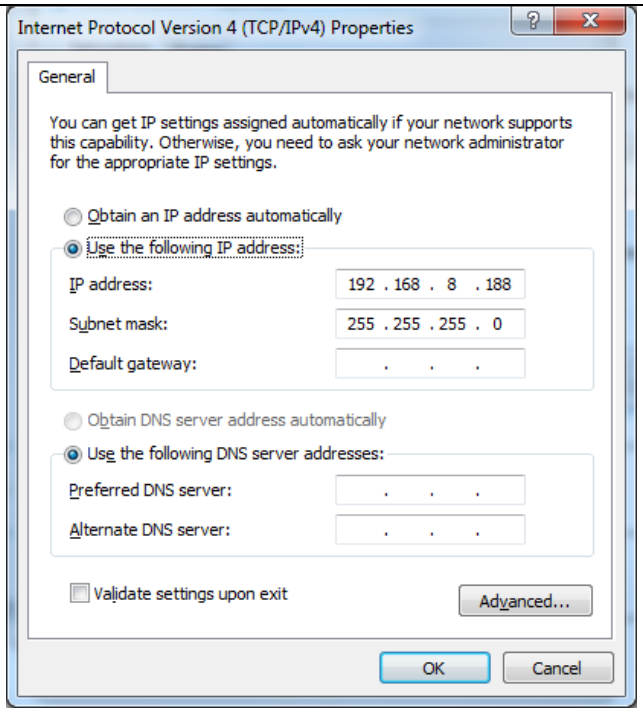
Configuration of External wireless AP

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]

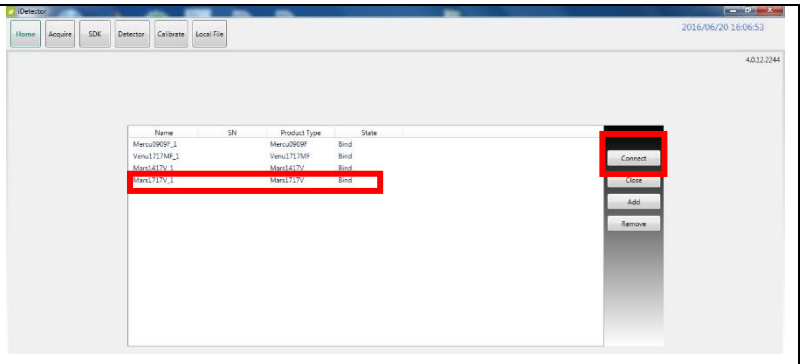
Configure 5GHz wireless network	SSID: NETGEAR_BIG_50 Security: WPA2-PSK Password: 12345678 Channel: [Please check the current Wi-Fi environment, and choose a relatively clean channel]
LAN setup	
Configure LAN IP address	IP address: 192.168.8.1 Subnet Mask: 255.255.255.0
External wireless AP reboot	Apply above settings and reboot your wireless router.

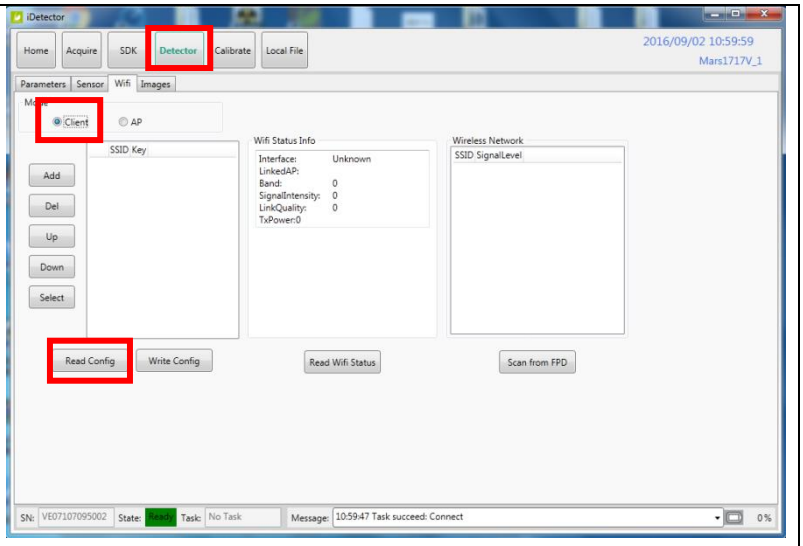
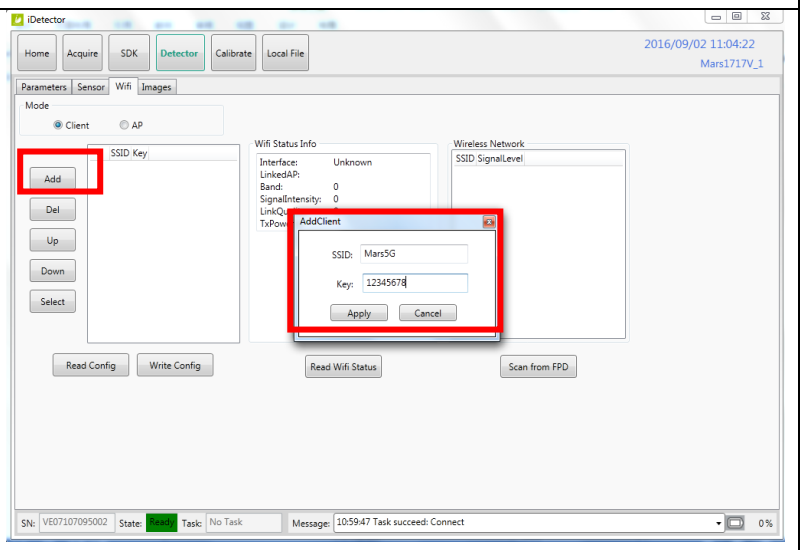
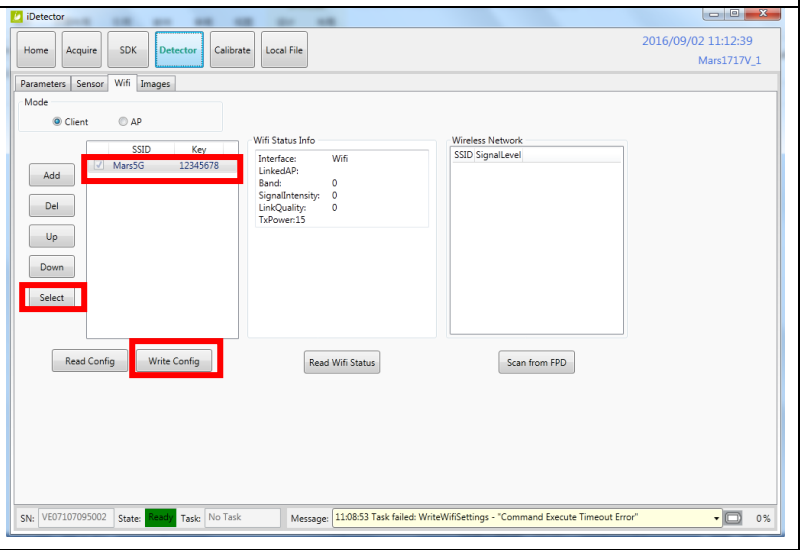
Recover local network IPv4 setting	
IP setting Network mask setting	IP address: 192.168.8.188 Subnet mask: 255.255.255.0

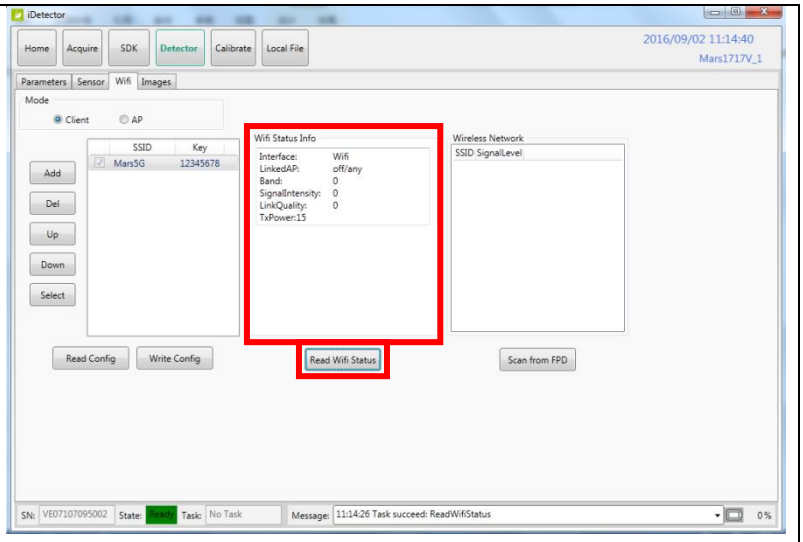
Configuration of detector

Either Wired Cable or Infrared device can be used to configure detector in wireless client mode. The wired connection should be used by the service operator only.

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

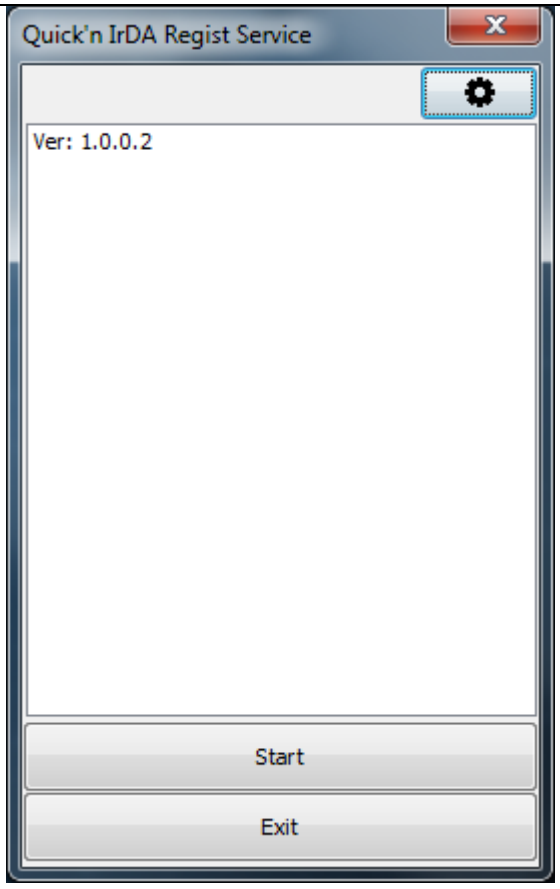
Connect panel to Workstation with Ethernet Cable like 3.4.1	

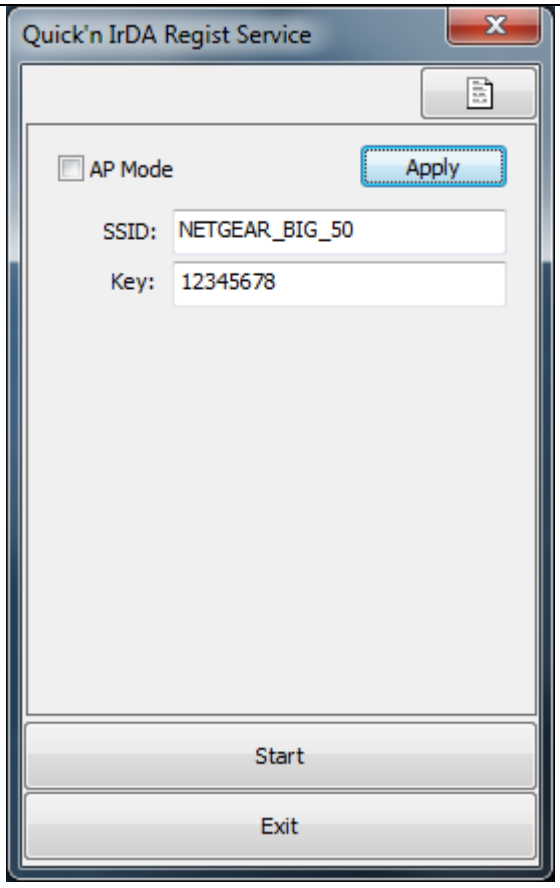
Click “Detector” Click”Read Config” Choose Client mode	
Click “Add” Type SSID and Password Click”Apply”	
Choose SSID and select(There will be √ occurred)” Click ”write config” to save parameters.	

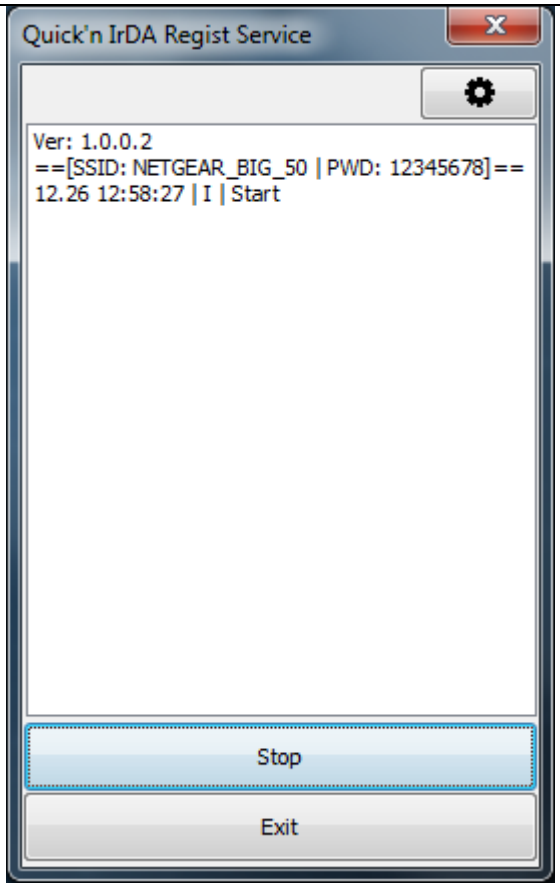
Turn on wireless router. Make sure there are wired connection between router and work station and IP 192.168.8.188. Click"Read wifi Status" to check wireless transmission status, numericl value occurred means the link is up and available.	

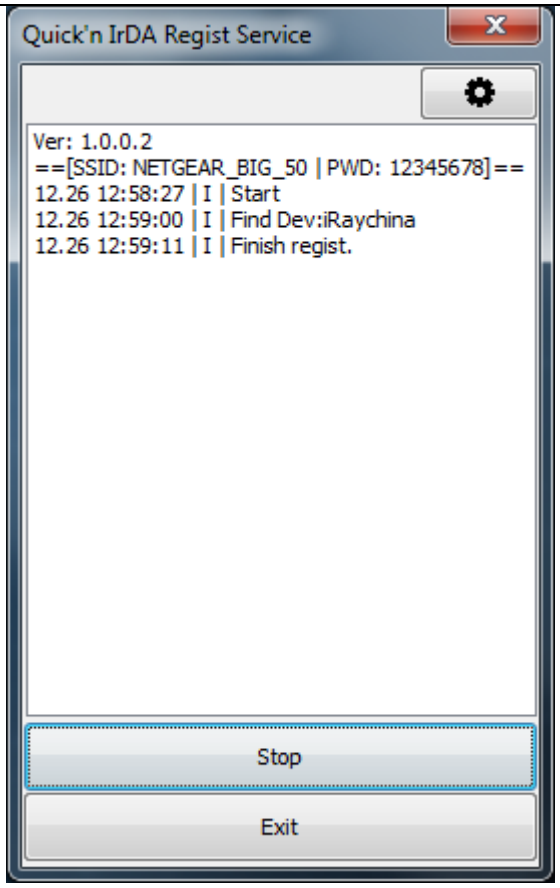
Since we have chosen default SSID and password, it would connect to wireless AP immediately after powered on next time.

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	/

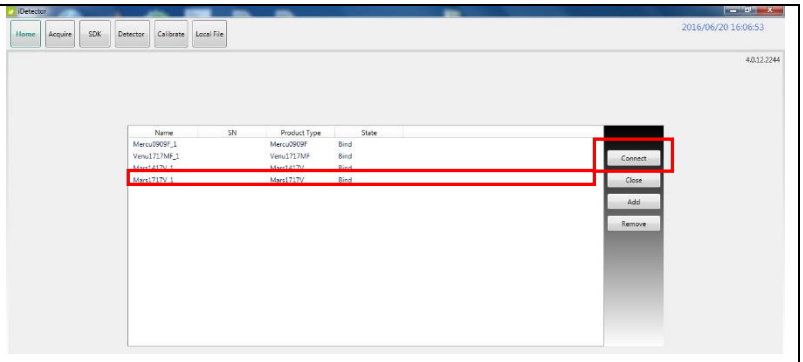
3.4.1.3 Wireless AP Mode

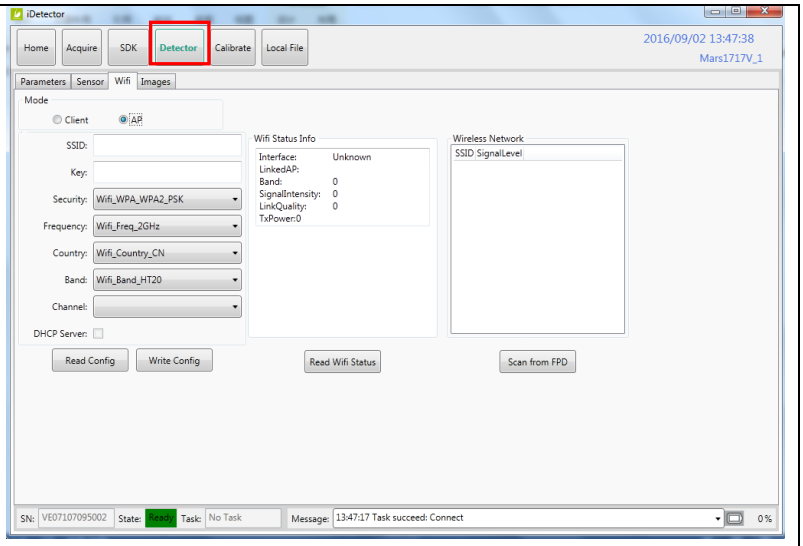
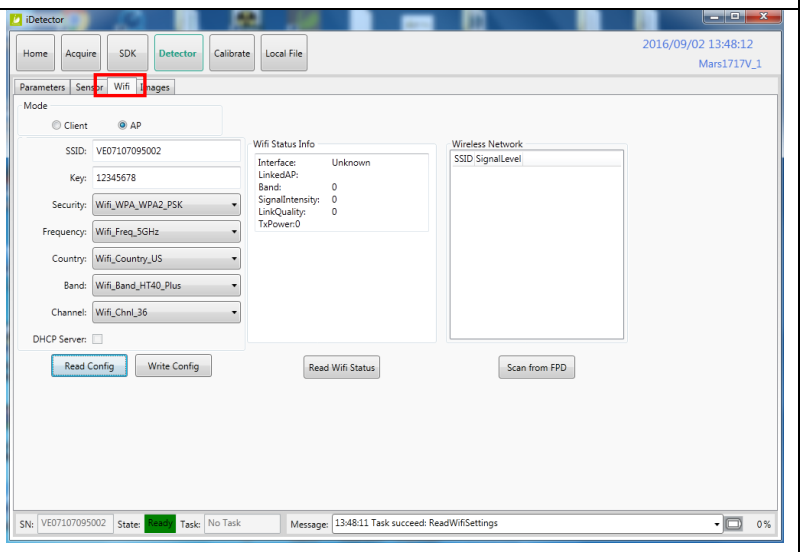
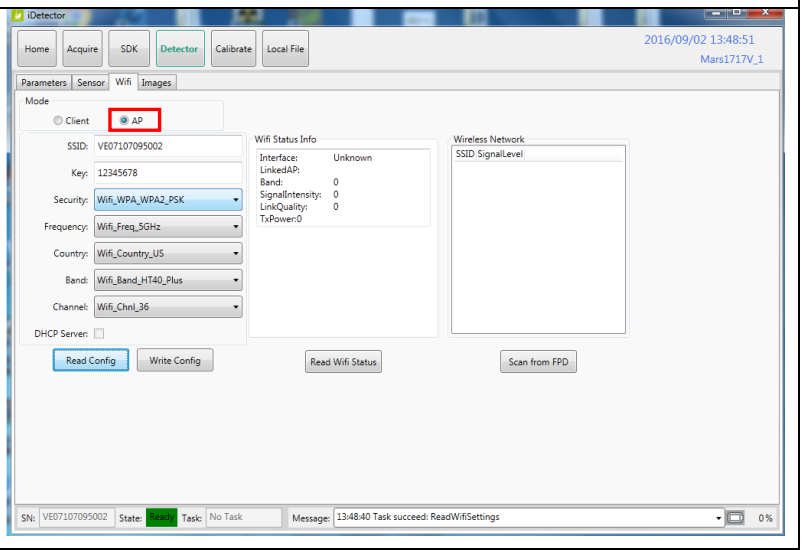
To complete wired connection configuration, user has to finish actions listed below.

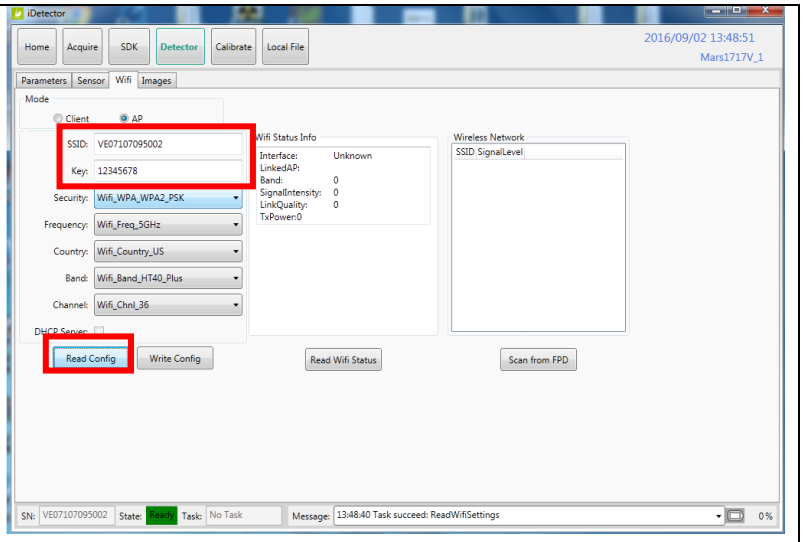
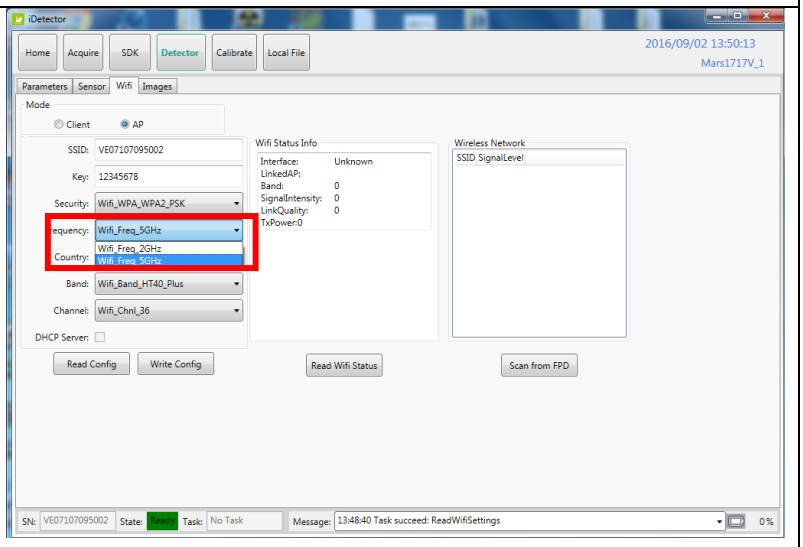
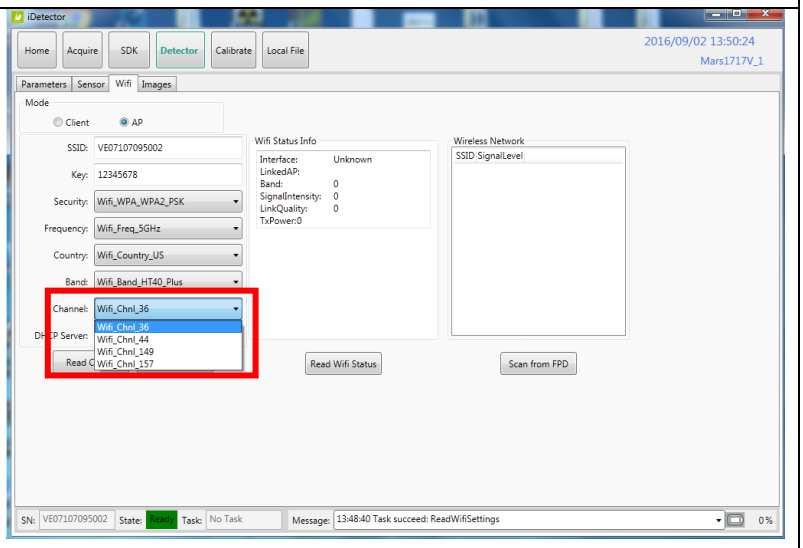
Configuration of detector

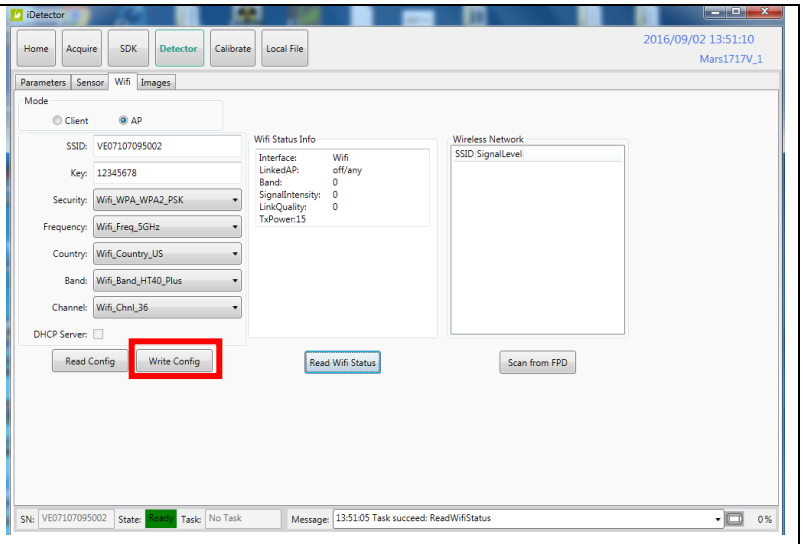
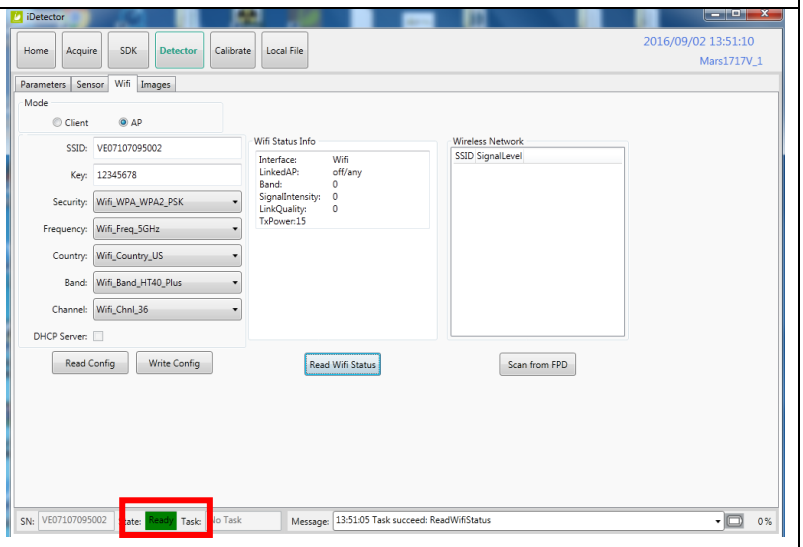
Either Wired cable or Infrared device can be used to configure panel wireless AP mode. The wired connection should be used by the service operator only.

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

Connect panel to Workstation with Ethernet Cable like 3.4.1	

Click “Detector”	
Select ”wifi”	
Choose AP mode	

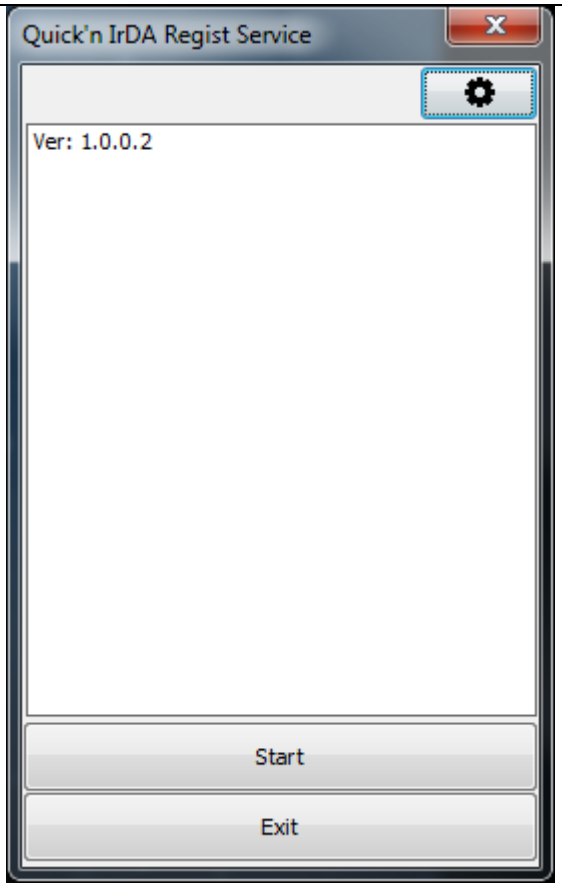
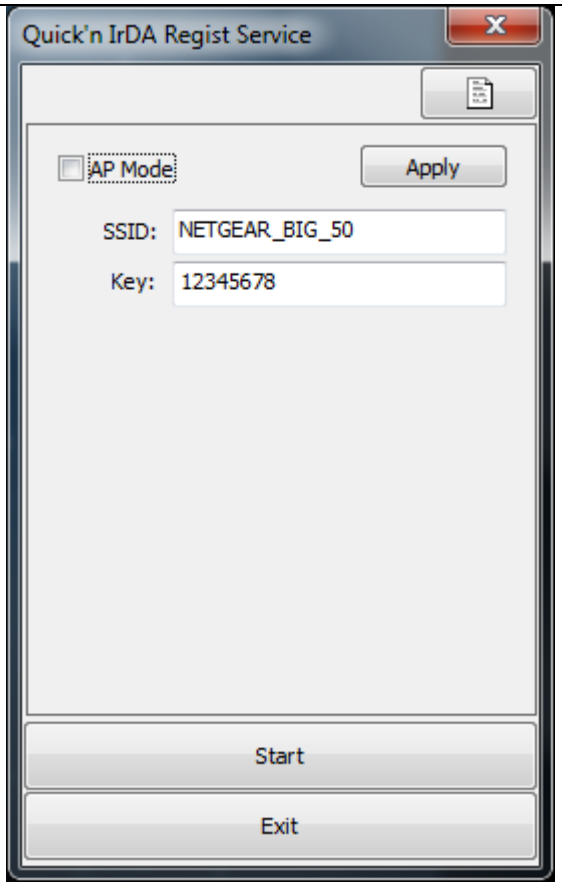
Click “Read Config” to get default setting. Change SSID and password setting , make sure SSID is different from other already exist;	
Change channels and frequency setting	
Click ”Channel” and choose a clean frequency and channel	

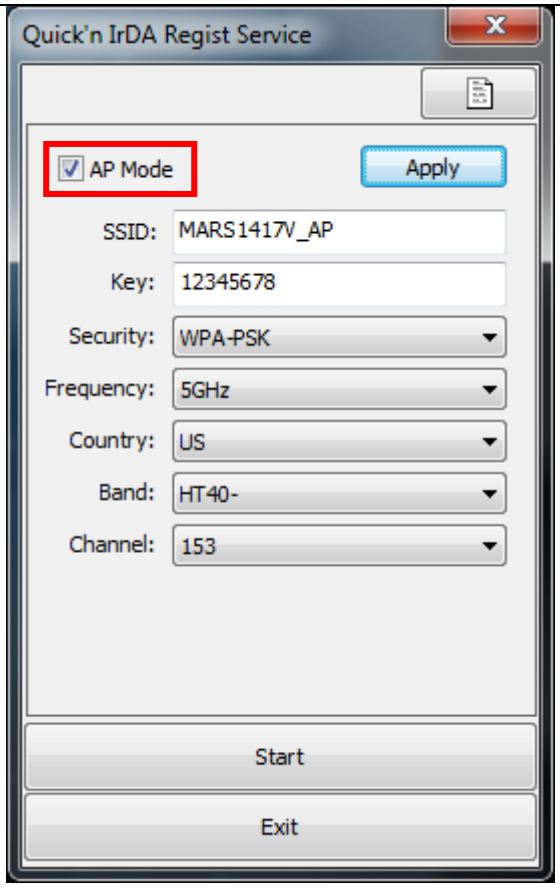
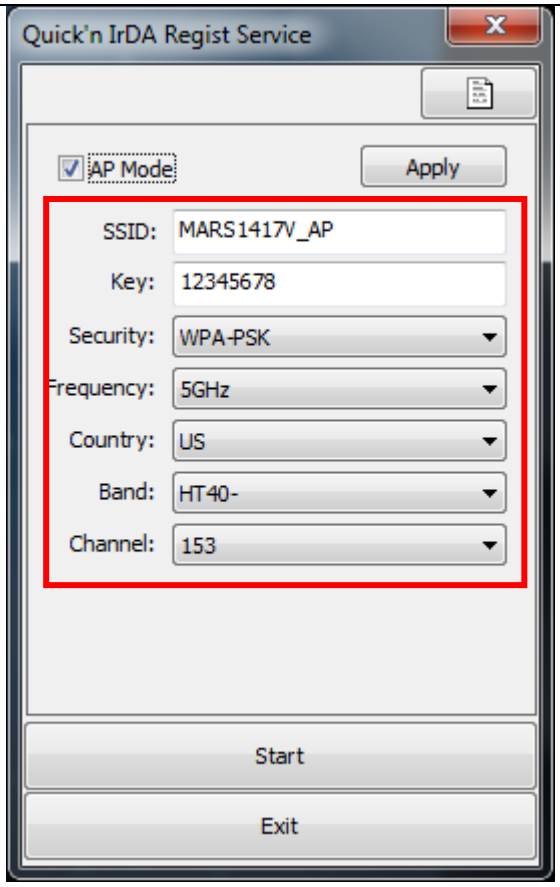
Click ”write config”	
Do not remove wired cable until FPD status from Busy become Ready	

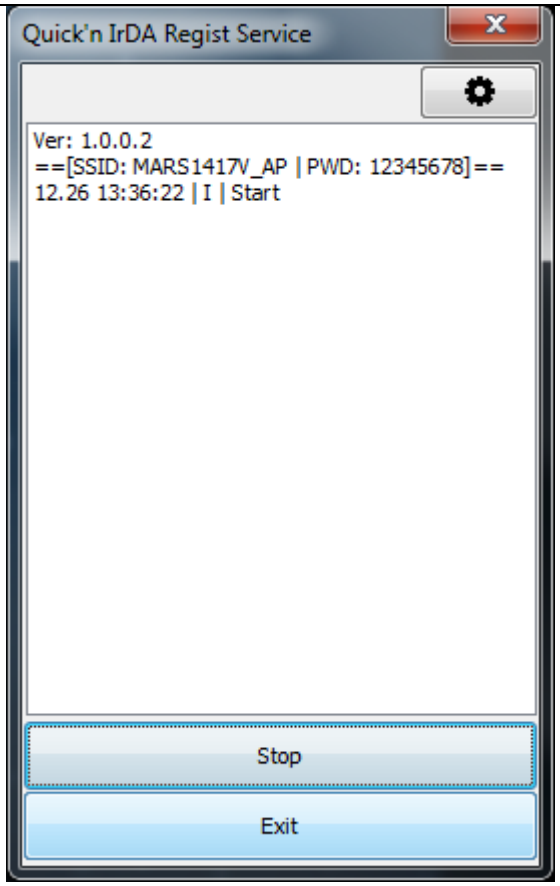
Since we have chosen default SSID and password, it would connect to wireless AP immediately after powered on next time.

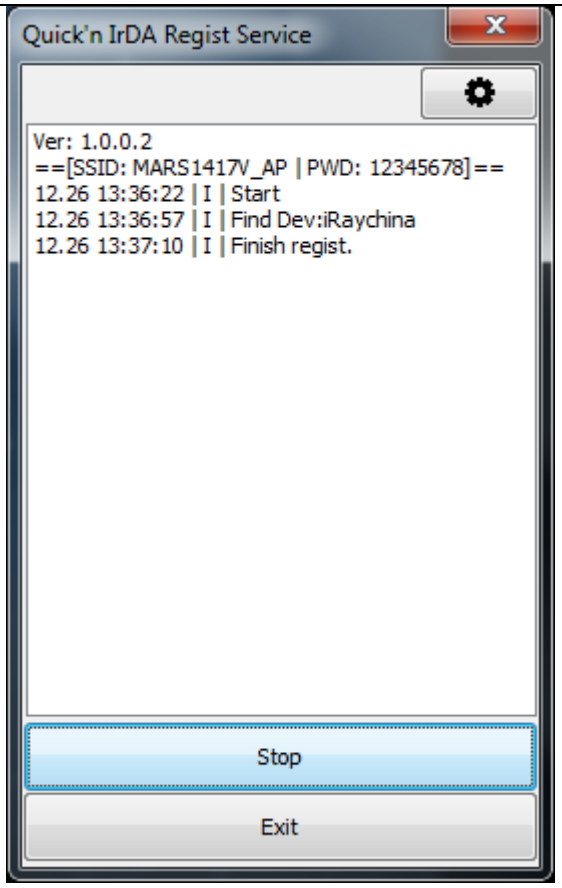
b.To start Infrared configuration, please see below

Connect Infrared device with Workstation	/

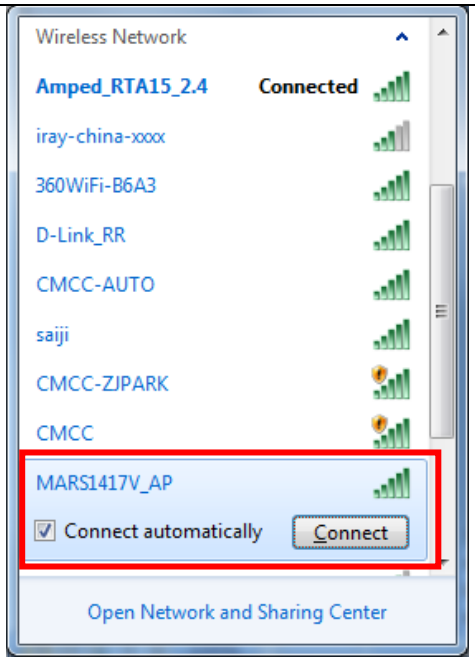
Start IrDARegister.exe	
Click “ ” to open wifi setting	

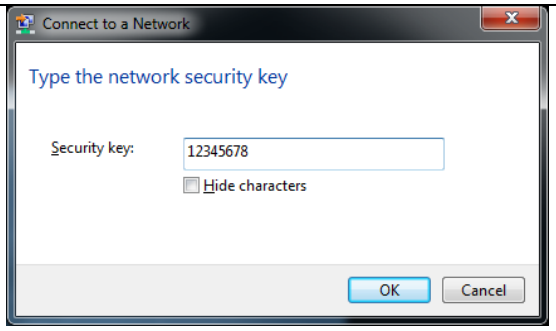
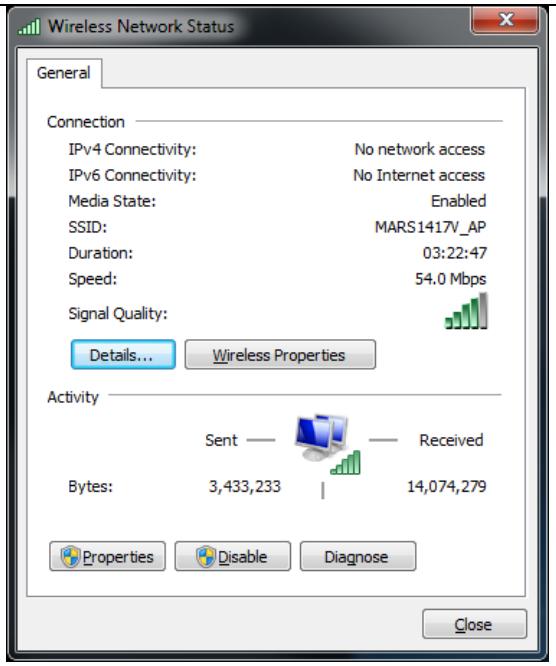
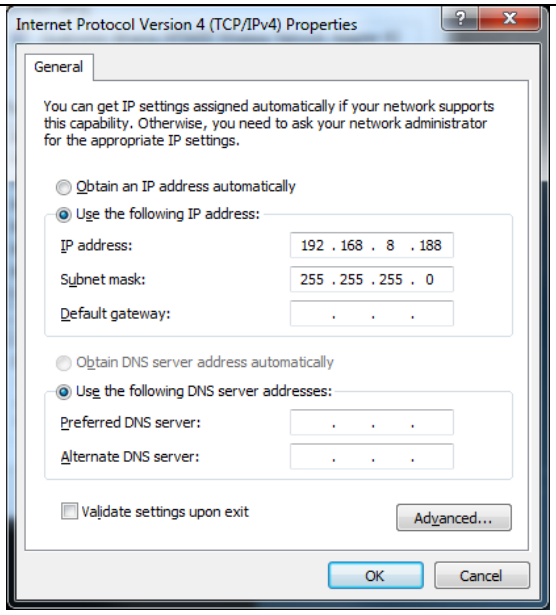
Select “AP mode”	
Change SSID and password and other parameter, make sure SSID is different from other already exist;	

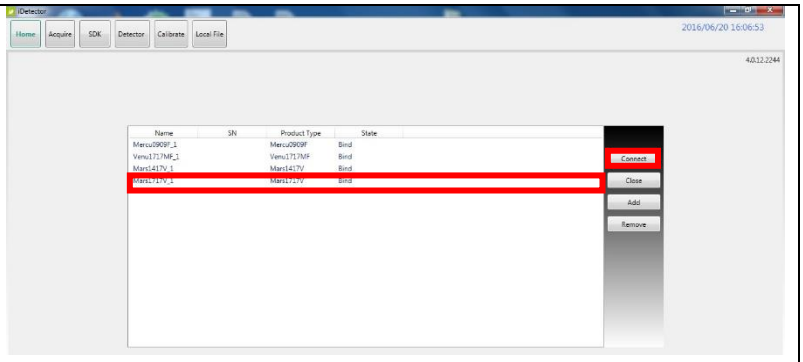
Click “Apply”	/
Click”  ”	/
Click”Start”	

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 choose product start connection	

4. Operation

Mars1717V provides SDK for user to integrate panel into their DR system. Additionally, it also provides an application for demonstration, i.e. iDetector. User can use iDetector to control panel without DR system.

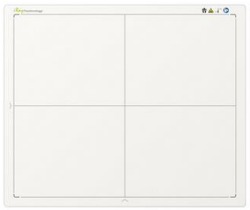
4.1 Main Operation

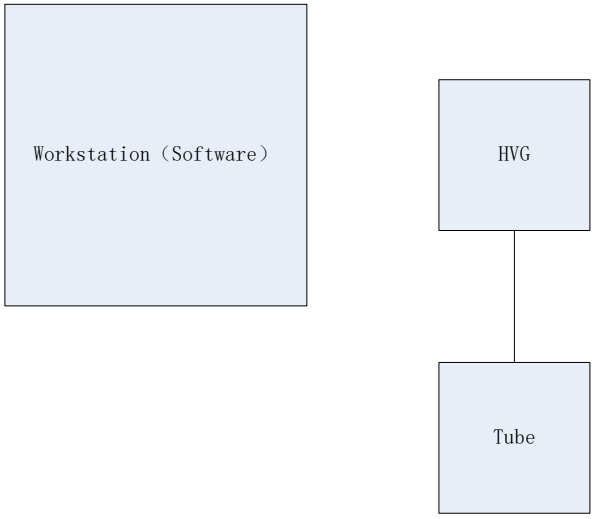
To Acquire X ray image is the main operation of Mars1717V. Most importantly, panel should build synchronization with X ray generator.Mars1717V is born with four ways to acquire x ray image, that is Software Mode, Inner Mode, Prep Mode and FreeSync Mode.

4.1.1 Software Mode

4.1.1.1 Block Diagram

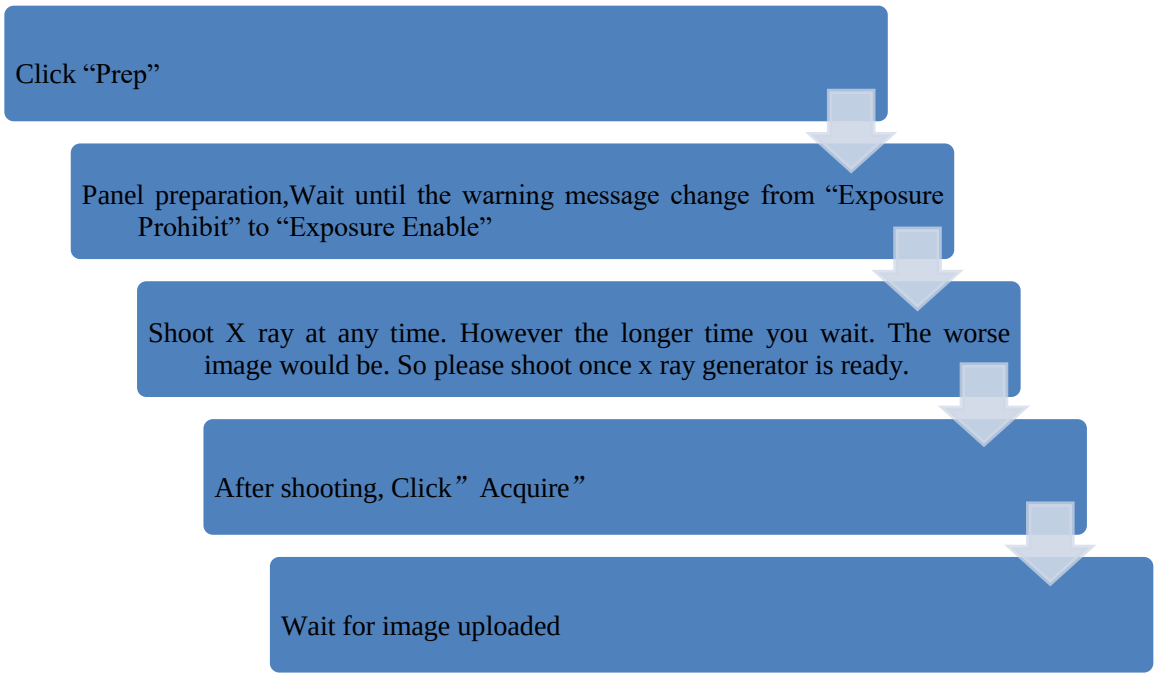
Software mode is the basic way to acquire x ray image. Please see figure below for general feature





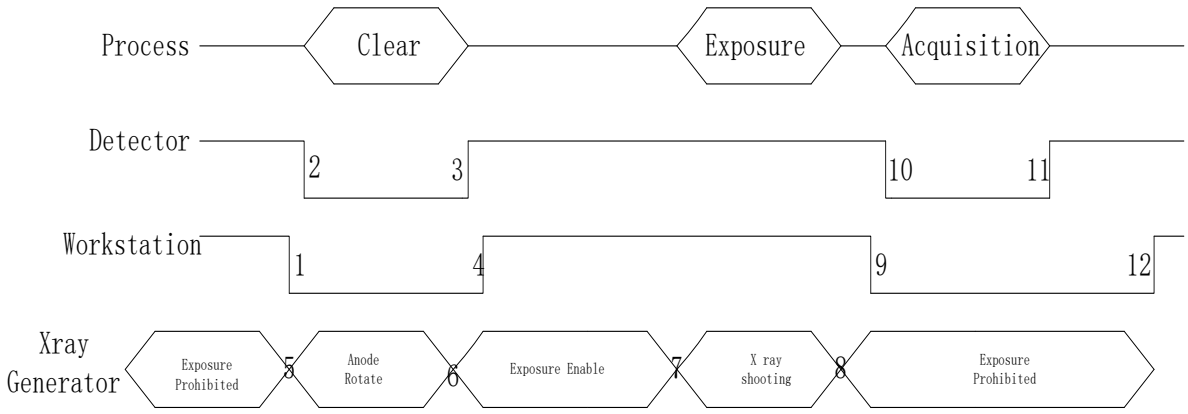
Workstation is a host device installed with iDetector and SDK. Chapter 3 has described how to establish connection between panels and workstation. In software mode, workstation does not control x ray generator. Users would decide when to shoot x ray.

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.

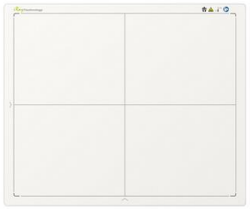
2. Panel receives “clear” from workstation, starts clearing leakage of panel. Meanwhile, panel send a message to workstation “Exposure Prohibited”.

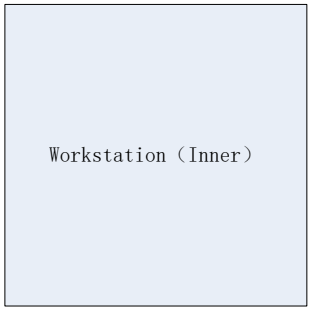
3. Panel finishes “Clear” and send a message to workstation “Exposure Enable”.

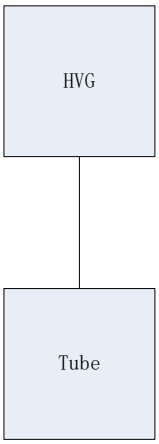
4. Workstation shows “Exposure Enable” on the IDetector’s message bar to tell user shoot X ray now.
5. User triggers x ray generator to initialize and do anode rotation to prepare for X ray shooting.
6. X ray generator finishes preparation for X ray shooting and reminds user to shoot.
7. X ray generator 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 which are after calibration if Hardware calibration is on.

4.1.2 Inner Mode

4.1.2.1 Block Diagram

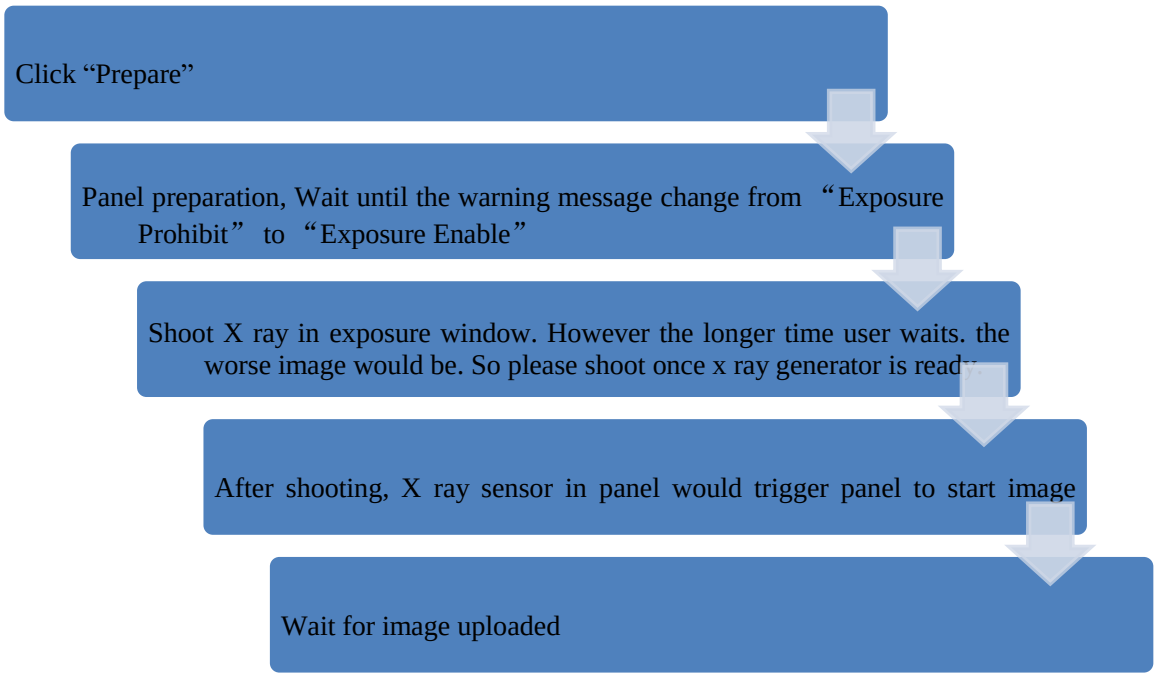






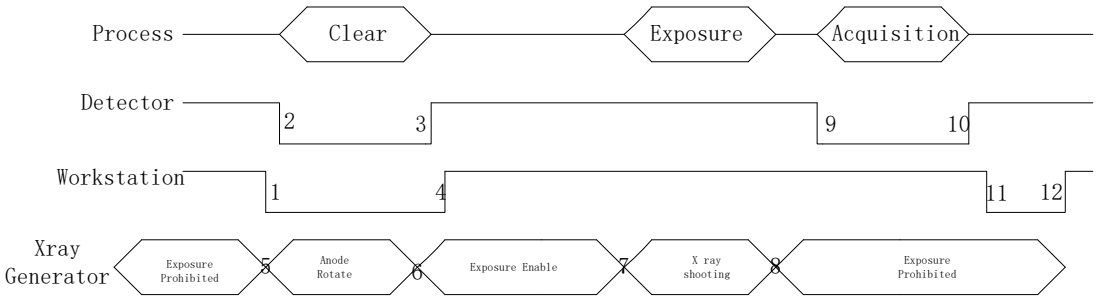
Workstation is a host PC device installed with IDetector and SDK. Chapter 3 has described how to establish connection between panels and workstation. In inner mode, workstation does not control x ray generator. Users would decide when to shoot x ray.

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 iDetector’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.

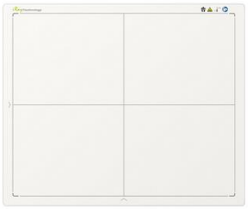
10. Panel completes image acquisition and begins to send data to Workstation.

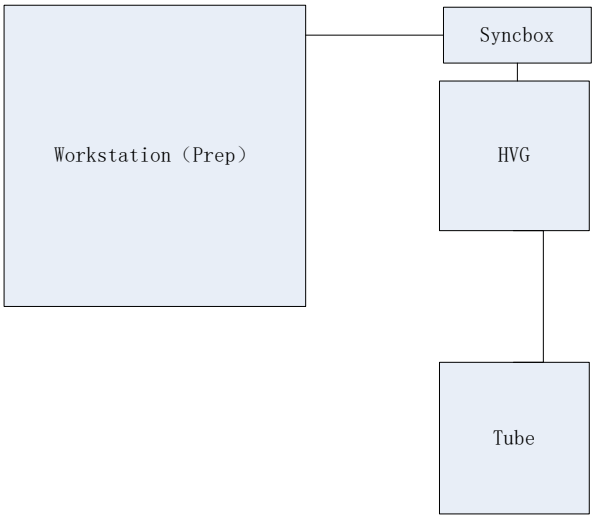
11. Workstation starts receiving image data from panel.

12. Workstation receives all image data from panel which are after calibration is Hardware calibration is on.

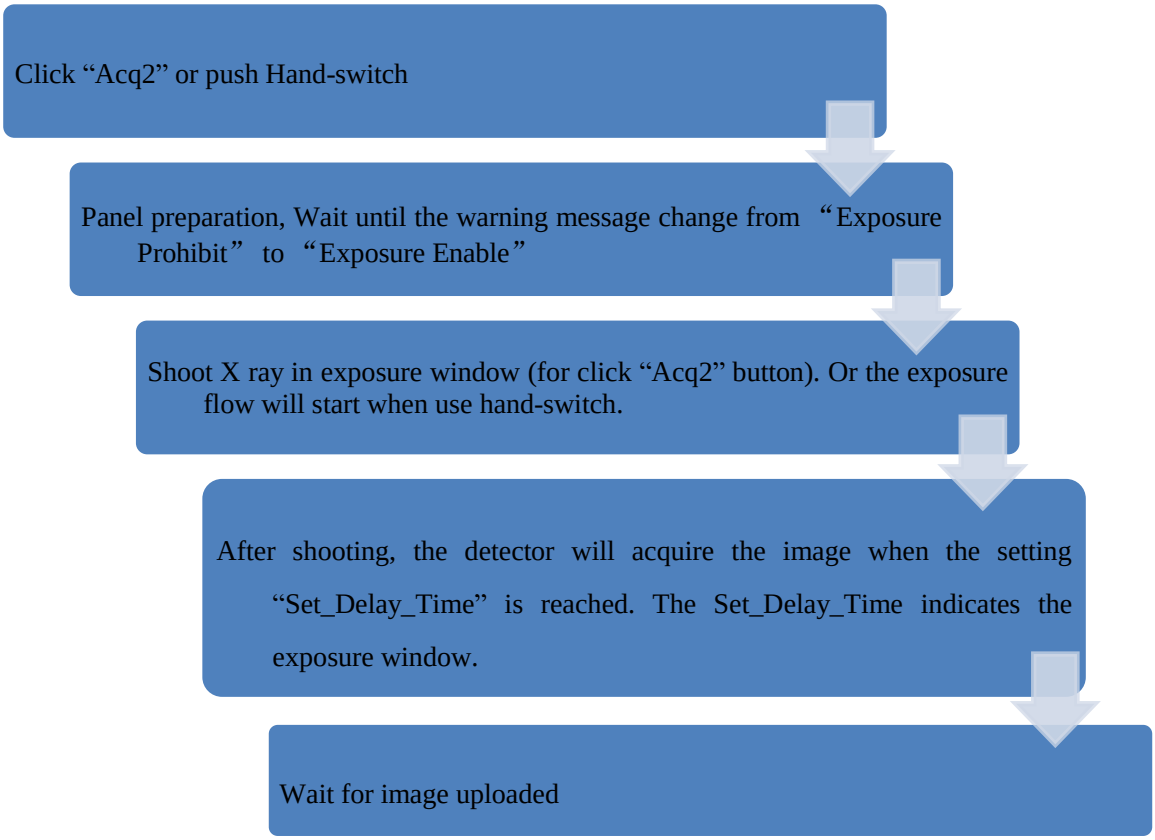
4.1.3 Prep Mode

4.1.3.1 Block Diagram

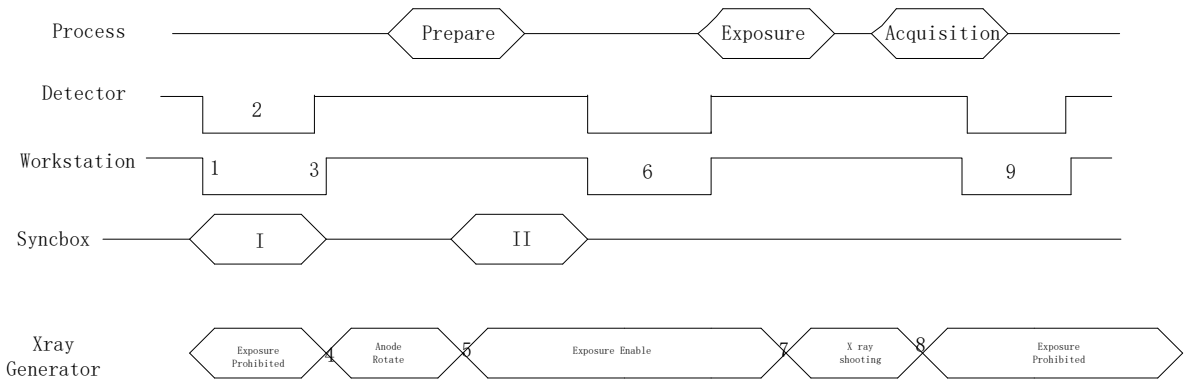




4.1.3.2 WorkFlow



4.1.3.3 Timing Setting



1. Workstation receives “I” information from the syncbox and check the state if the exposure flow is permitted from the panel.

2. Panel receives the check information and send the “OK” reply, after that it will wait for the acq2 command.

3. Workstation receives the “OK” information and replies to the syncbox to open the prepare process of the HVG.

4. Syncbox trigger the prepare of the HVG to start the process.

5. After preparation of the HVG, the syncbox send the “II” information to the workstation to start the prepare process of the detector. And the HVG enters the exposure waiting state.

6. Workstation receives the “II” information and sends the “Acq2” command to the panel, after get the reply of “Exposure Enable” from the detector, it replies the syncbox to start the exposure.

7. X ray generator begins releasing x ray

8. X ray generator finishes x ray shooting.

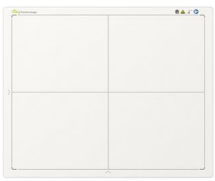
9. Panel acquire the image and sends to the workstation.

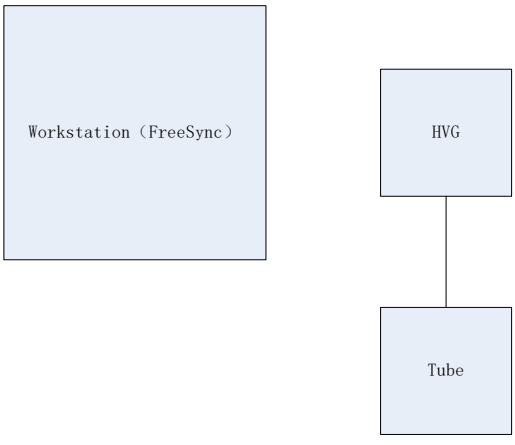
If Hardware Pre-offset and Hardware calibration is selected, image got is the final image.

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

4.1.4 FreeSync Mode

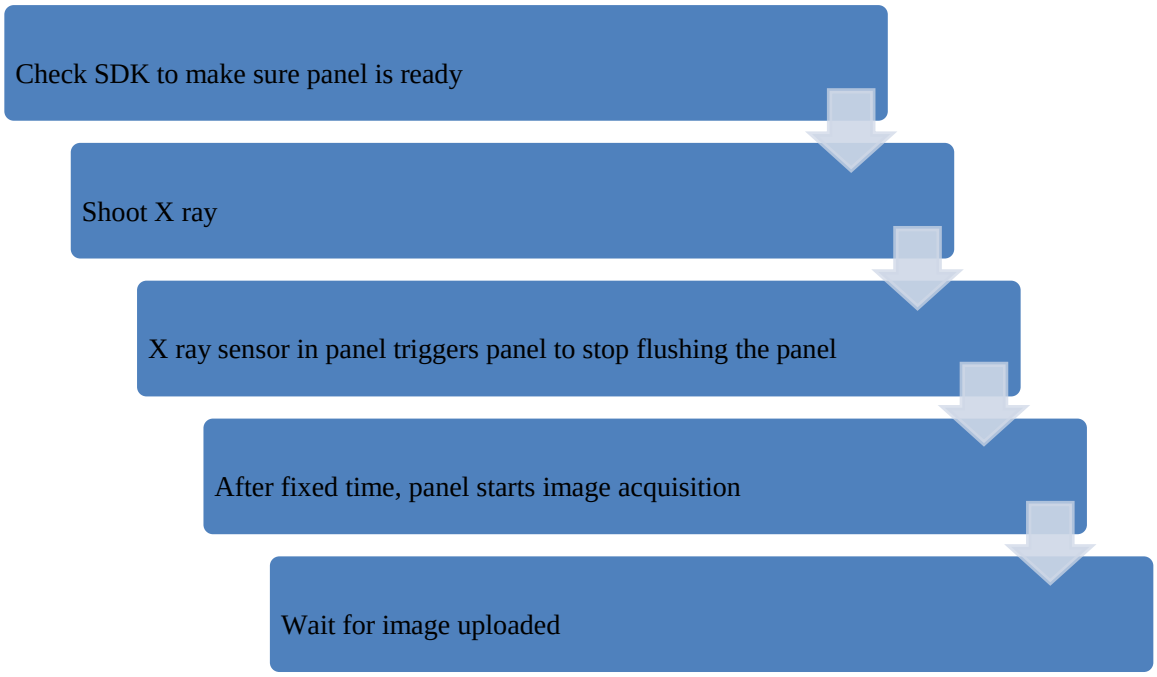
4.1.4.1 Block Diagram



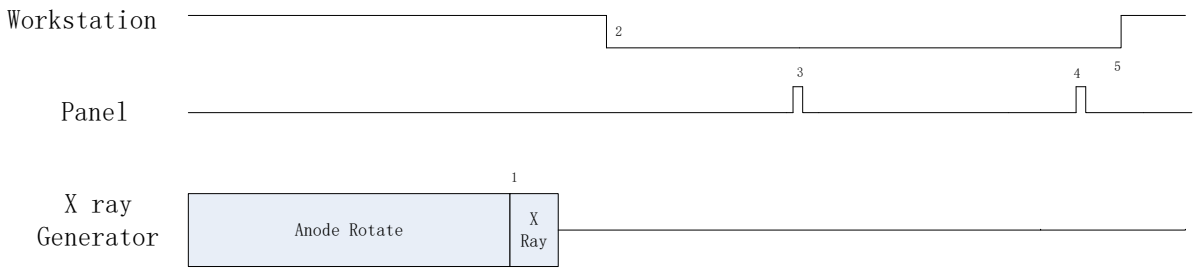


Workstation is a host PC device installed with iDetector and SDK. Chapter 3 has described how to establish connection between panel and Workstation. In FreeSync mode, User doesn't interact with Workstation. After shooting, images would be shown on screen immediately.

4.1.4.2 Work Flow



4.1.4.3 Timing Setting



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

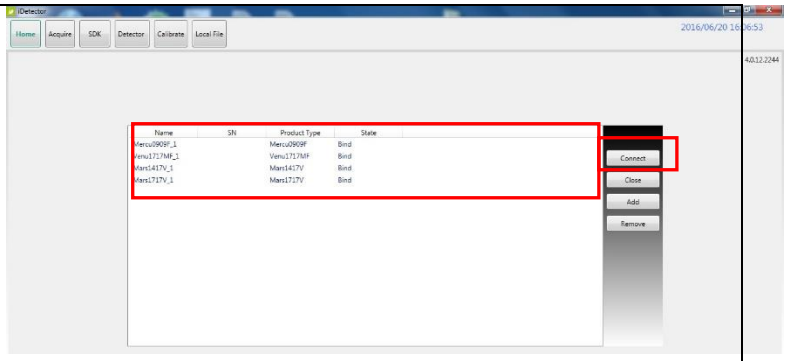
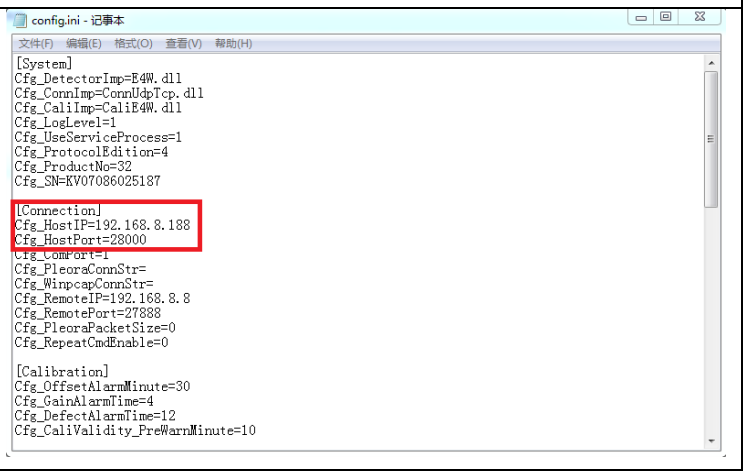
2. Workstation receives "Exposure Prohibited" from Panel.

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

Open SDK and choose product start connection	
Confirm the IP address and the Port are the same as the value in config.ini. The port should use the default value of 28000	

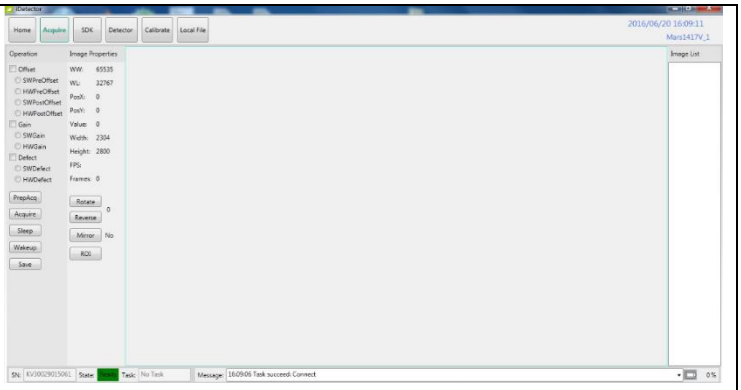
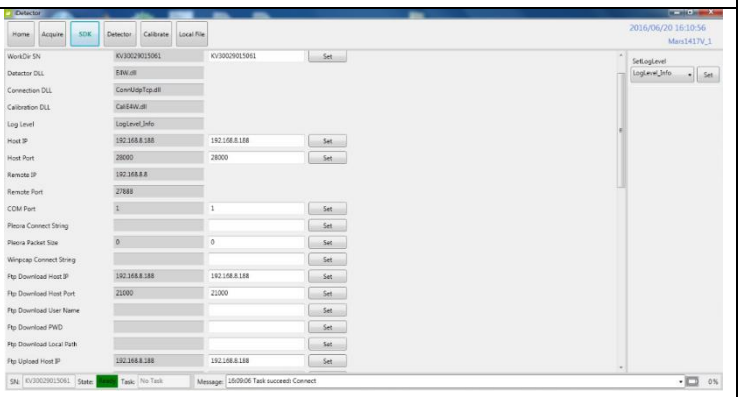
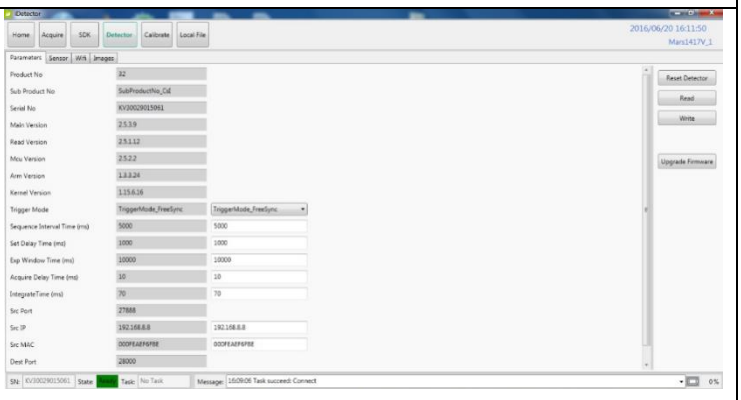
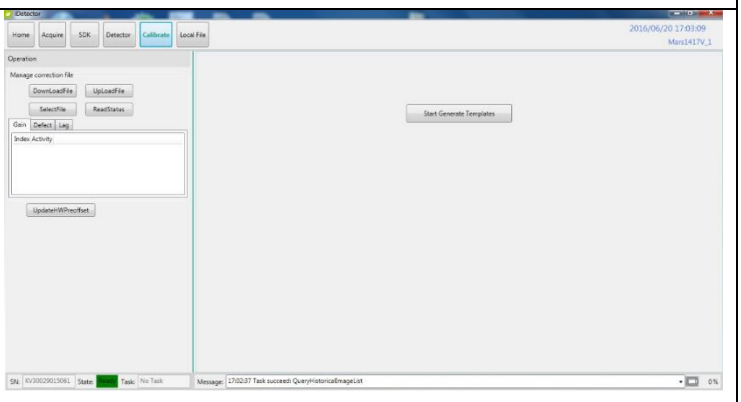
Note:

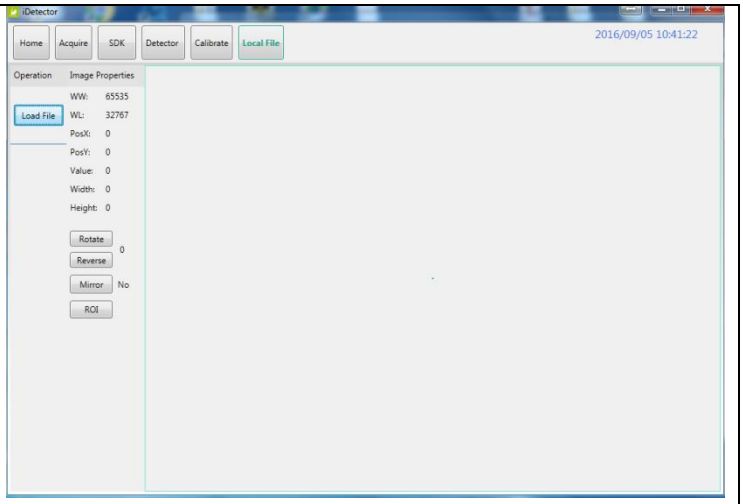
1. Once changing connection from different network card, user must re-connect panel with different IP address.

2. 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

Choose iDetector menu related modules	

Acquire module related setting, such as loading correction and calibration template, acquiring images	
SDK module related setting, such as IP address	
Detector module related setting, such as trigger module, wireless signal	
Calibrate module related setting, such as making correction and calibration template, template in panel could be uploaded to workstation, and template in workstation could also be downloaded to panel.	

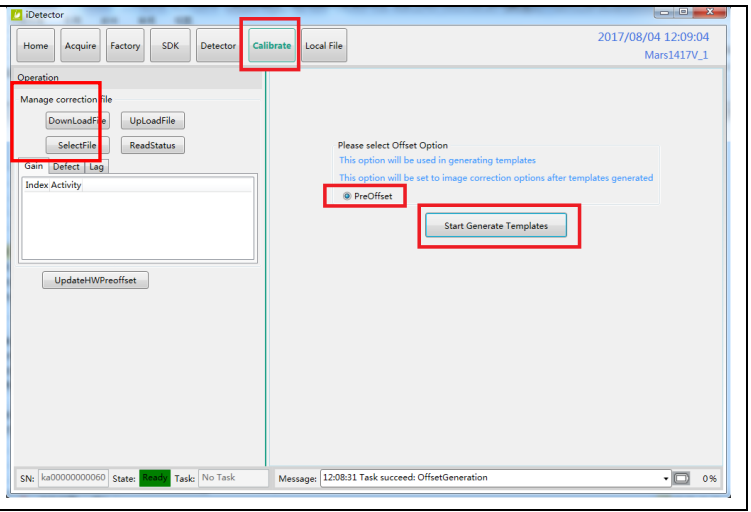
Local File module related setting, such as import Raw or DCM image.	

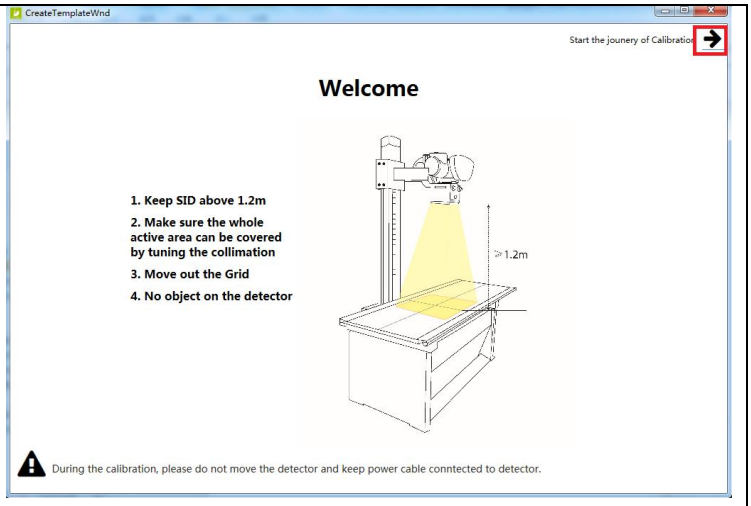
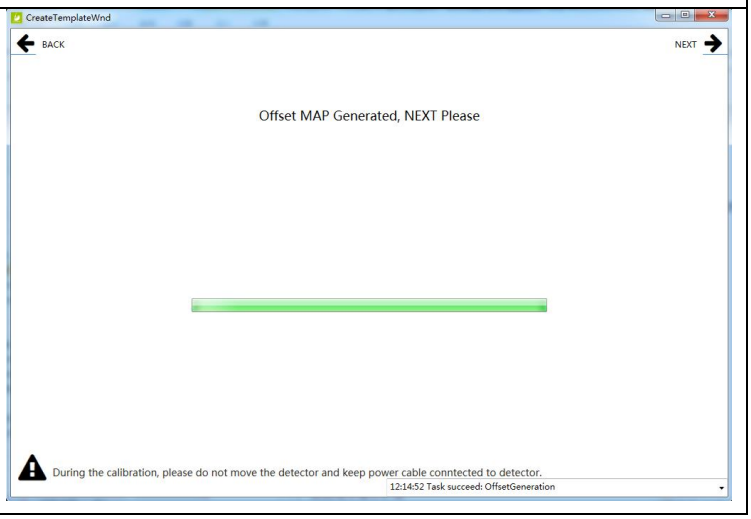
4.4 Correction and Calibration Template Generation

The correction and calibration should be performed after installation and it is recommended to perform the new correction and calibration after 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

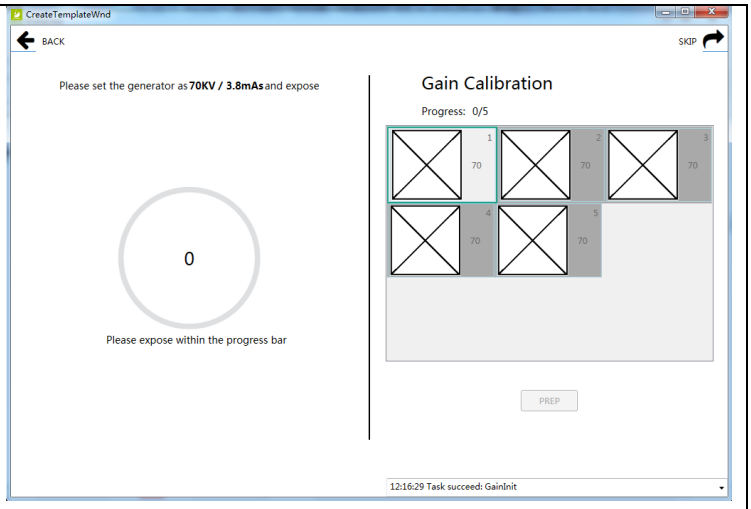
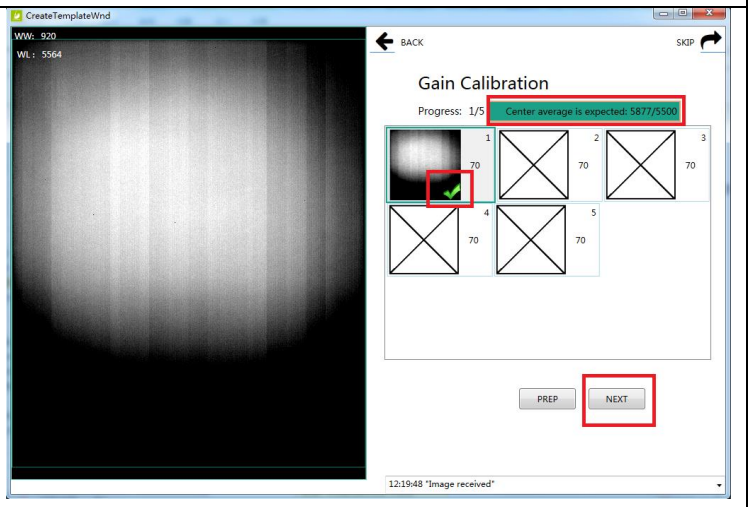
Choose “PreOffset”, and click “Start Generate Templates”	

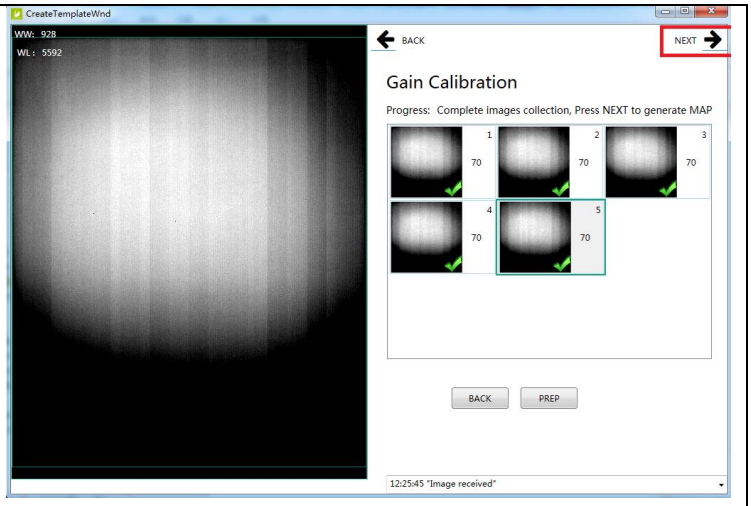
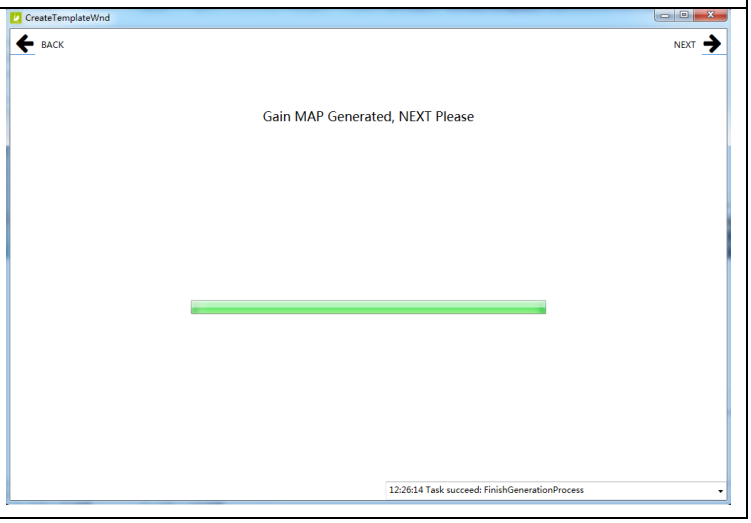
click “Start the journey of Calibration”	
And waiting for the finish	

4.4.2 Gain Calibration Template Generation

4.4.2.1 Gain Calibration Template Generation

Before Gain template generating, make sure SID1.2m, no copper is required, the GUI of the software maybe different with the below figures.

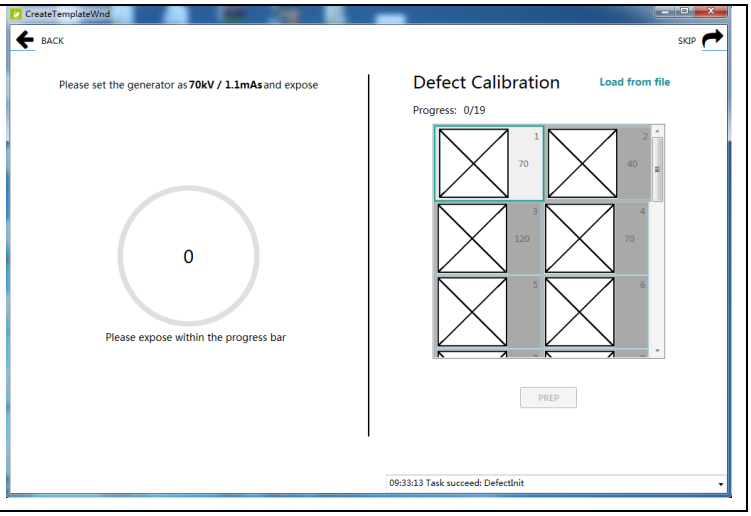
On Gain template generating page, there are five images that need to be got	
Start exposure, get the light image, and click “NEXT”	
If the warning occurs, it means the user should adjust the dose and re-exposure Click “NEXT”, and get five images	

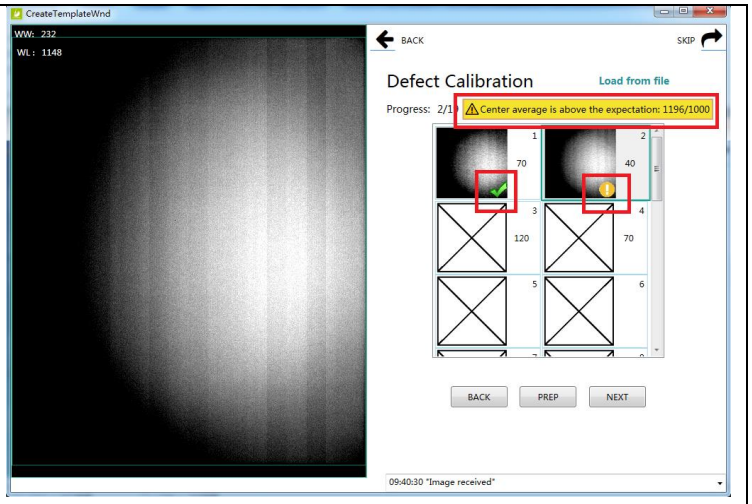
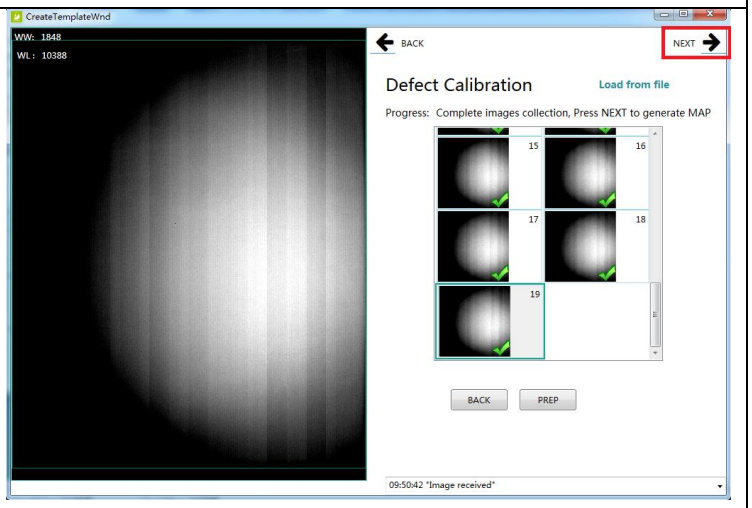
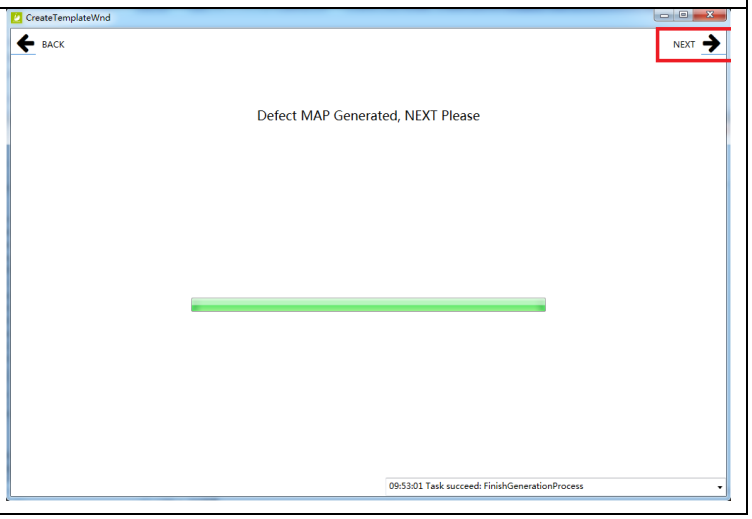
After getting five images, click “NEXT” to generate gain template	
Waiting for finish of gain template generating	

Notes:1 please use software post offset correction.

4.4.2.2 Defect Correction Template Generation

Before Defect template generating, make sure SID1.2m, no copper is required, the GUI of software maybe different with the below figures.

On the “Defect Calibration” page, start exposure, there are 19 images need to be captured.	

If the warning occurs, it means that the dose is not correct, please adjust the dost to re-exposure to get the correct image.	
Click “NEXT” when the process is finish.	
Click “NEXT” when the process is finish.	

Note:1 please use software post offset mode.

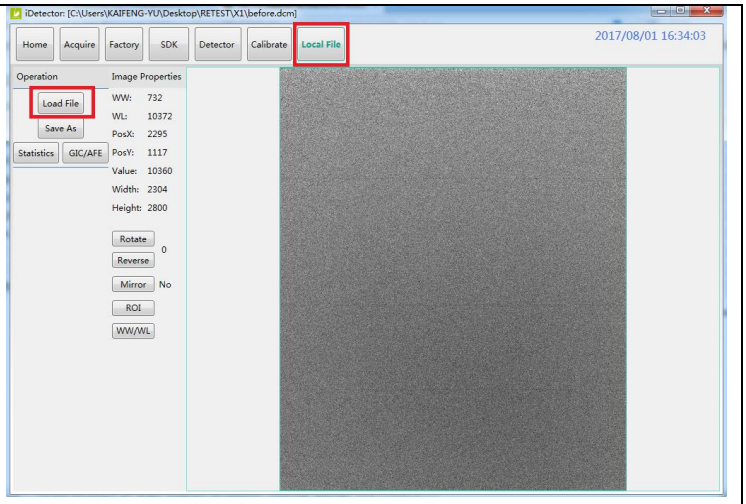
2. Make sure your x ray dose is right, if your dose is out of the range, IDetector will remind you to adjust the dose. Then you can click “start creating” and try again.

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

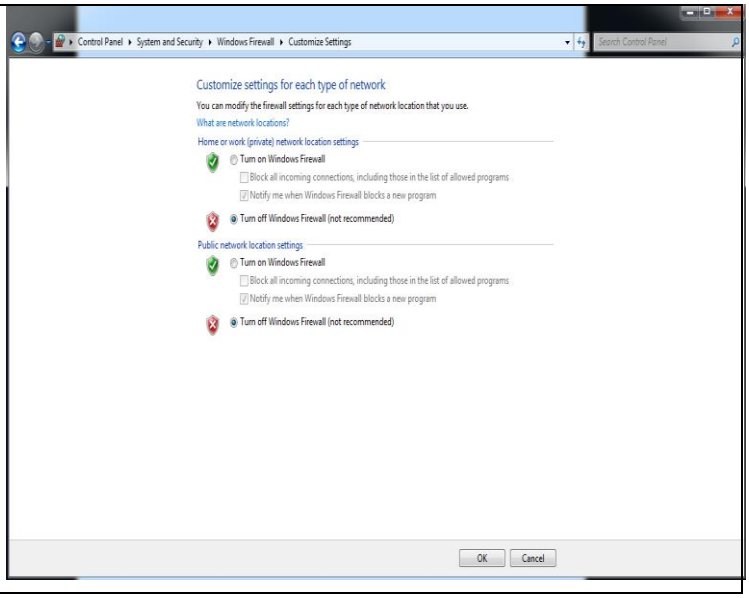
4.5 Image Check and upload

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

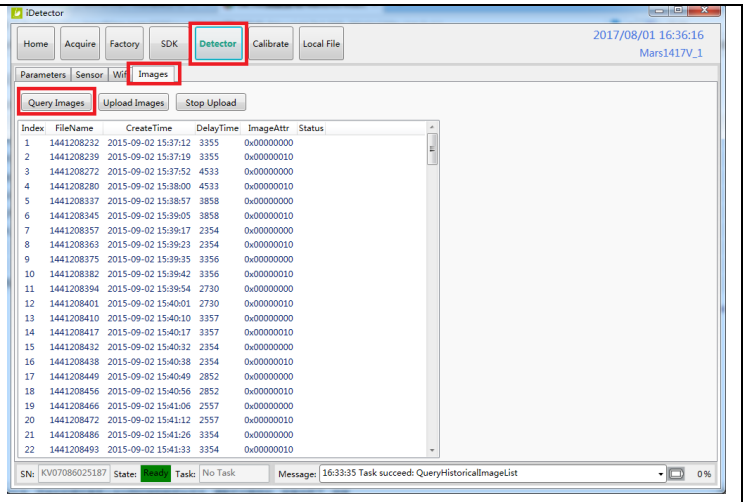
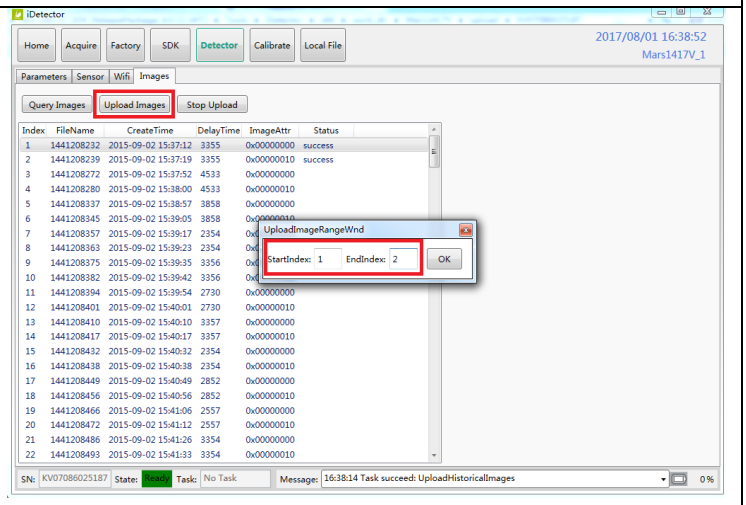
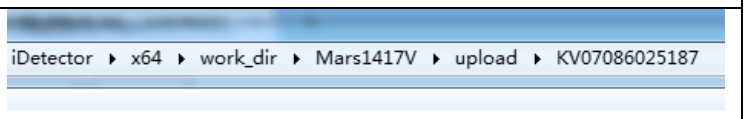
4.5.1 Local Image Check

Click “Local File” button in “Local File” UI, choose the specified file	
Choose images stored in Workstation, images would be shown on screen	/

4.5.2 Panel Image Upload

Make sure firewall is closed	

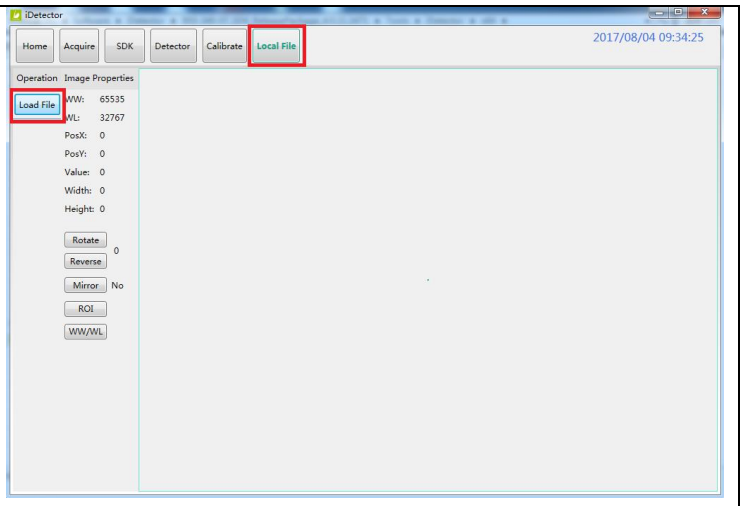
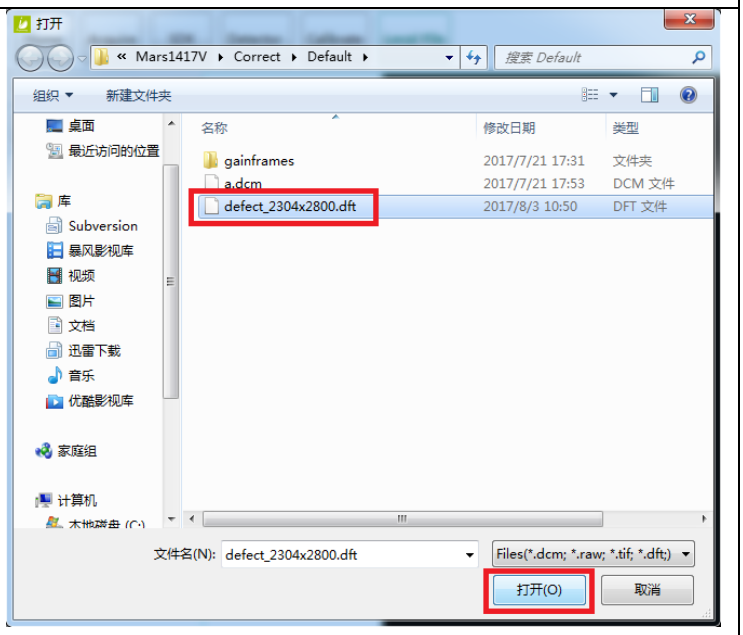
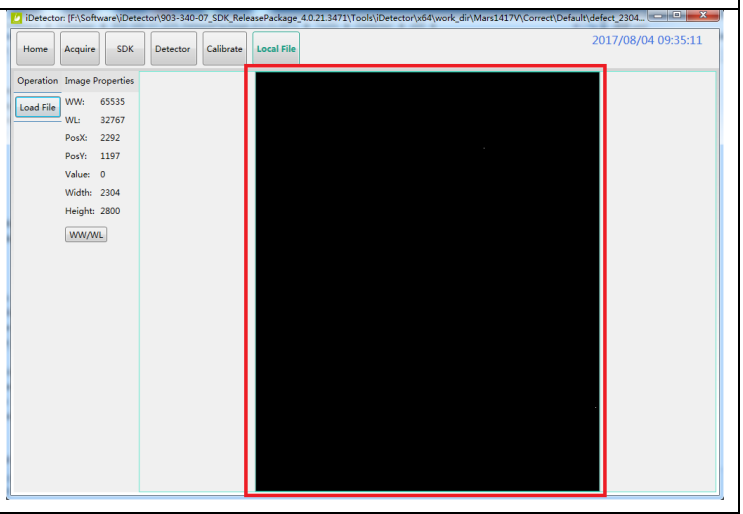
Panel Image is uploaded as following.

Click “Image” page in “Detector” UI Click “Query Images” button and the list will be showed which are stored in the detector	
Click “Upload Images”: choose the specified image, and click “OK”, after the state changed to “success” which means that the image has been uploaded User can cancel the process of uploading if click “Stop Upload”	
The uploaded images are saved under the path of the detector SN	

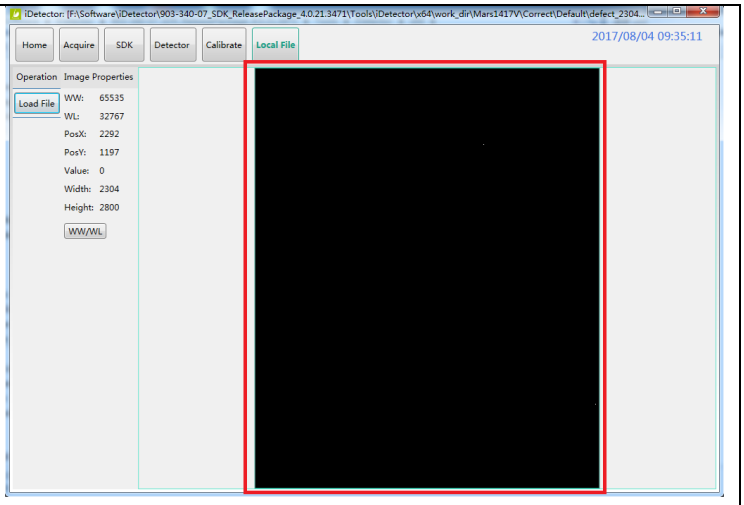
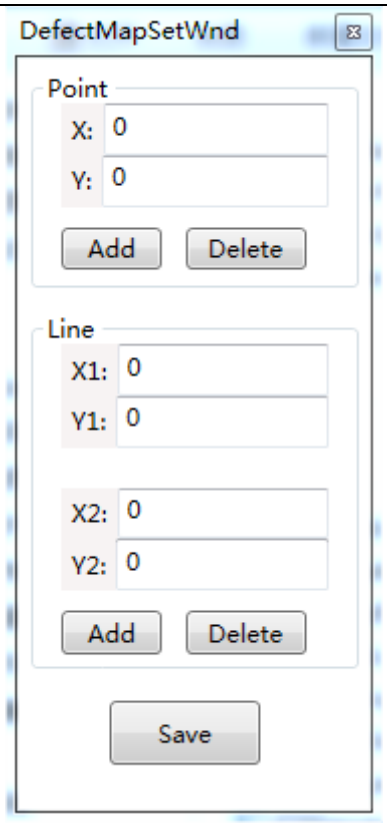
4.6 Defect Template Check and Modification

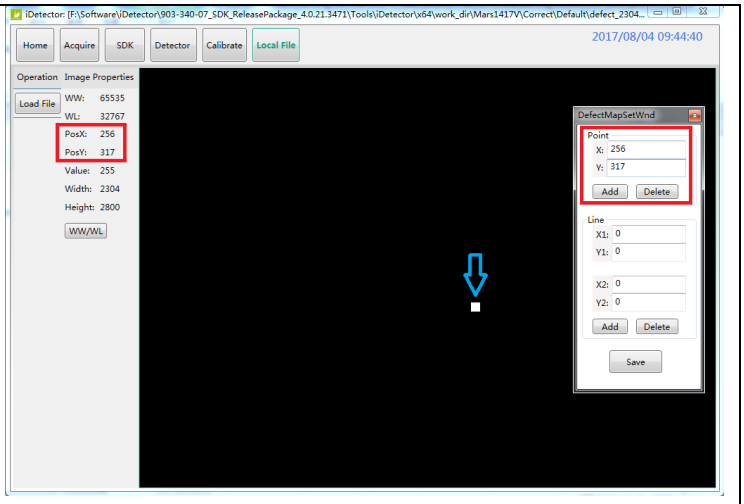
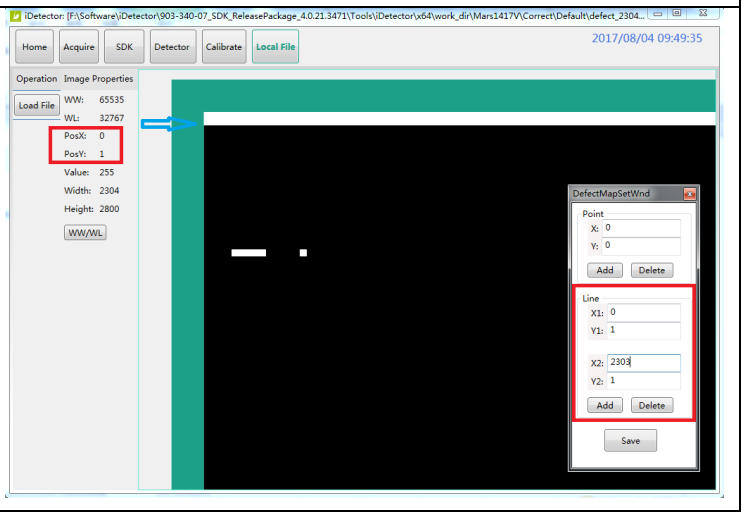
iDetector provides function to check defect template. If defect template has updates, user could add and delete defect pixel or defect lines by modifying defect template opened.

4.6.1 Defect Template Check

Click “LoadFile” on “LocalFile” page	
Choose the specified defect template, and click “Open”	
The defect template will showed on the UI	

4.6.2 Defect Template Modification

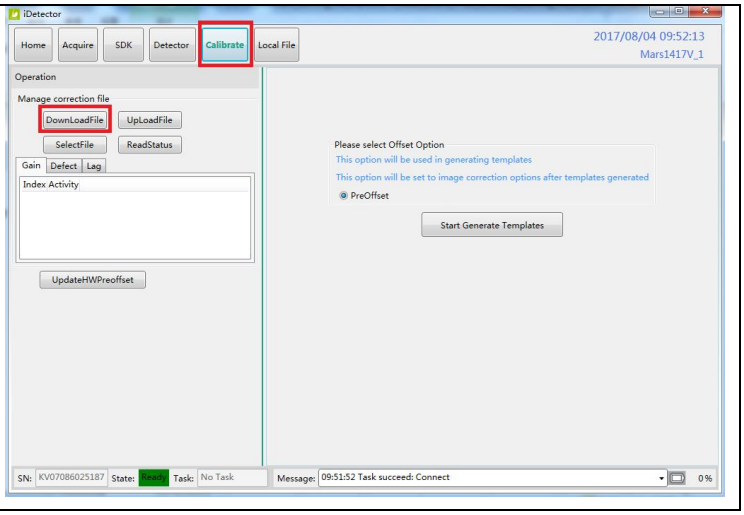
Open the specified defect template	
The defect management dialog box will be showed	

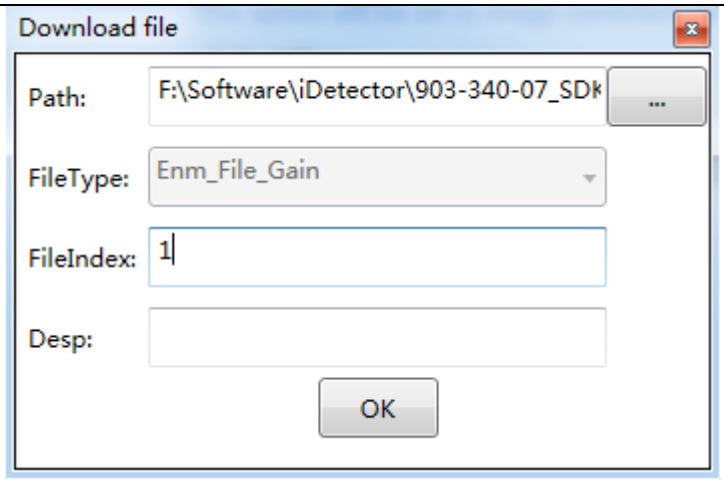
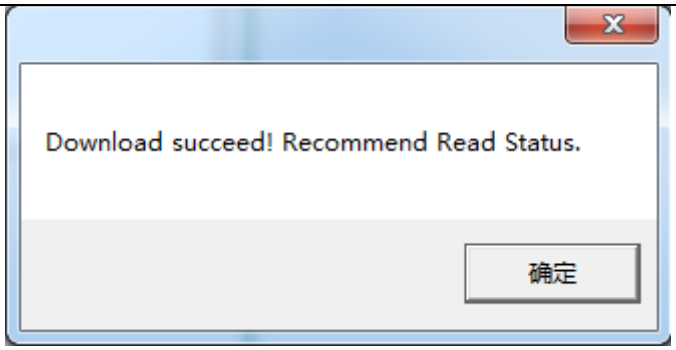
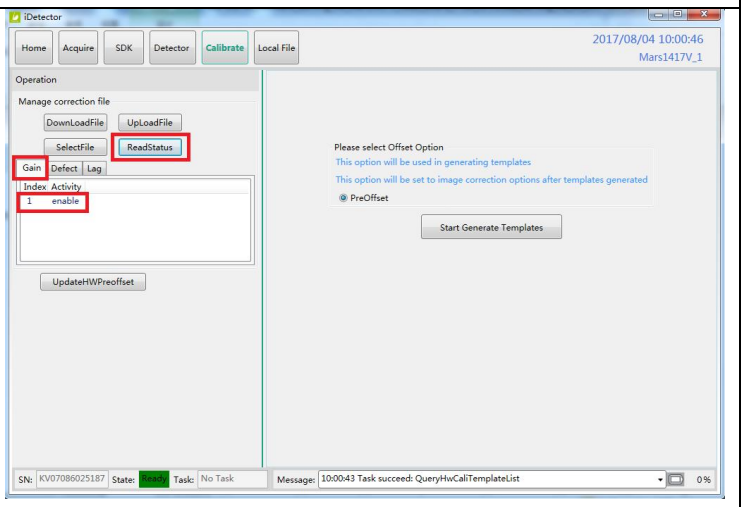
Find the pixel that needs to be managed, type the coordinate of the pixel and click “Add”, the information will be added to the template If click “Delete”, the information will be deleted Click “Save”	
It is similar to manage the defect pixel, If user need to add the defect line, type the coordinate of the line and click “Add” If the information needs to be deleted, click “Delete”	

4.7 Correction and Calibration Management

4.7.1 Correction and Calibration template synchronization

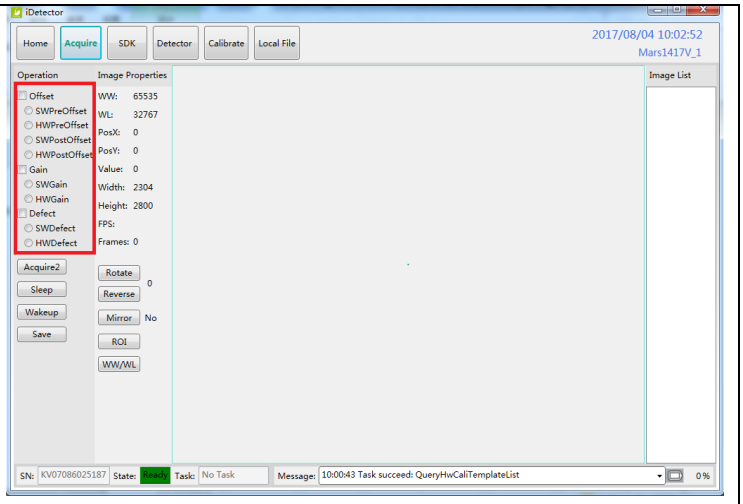
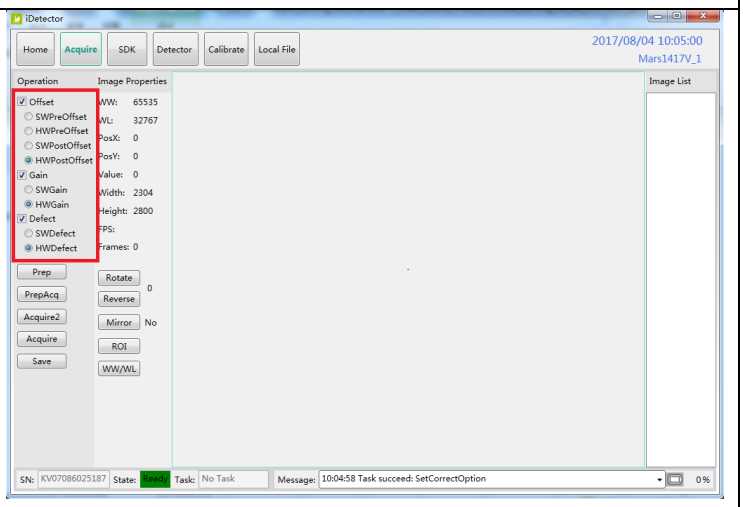
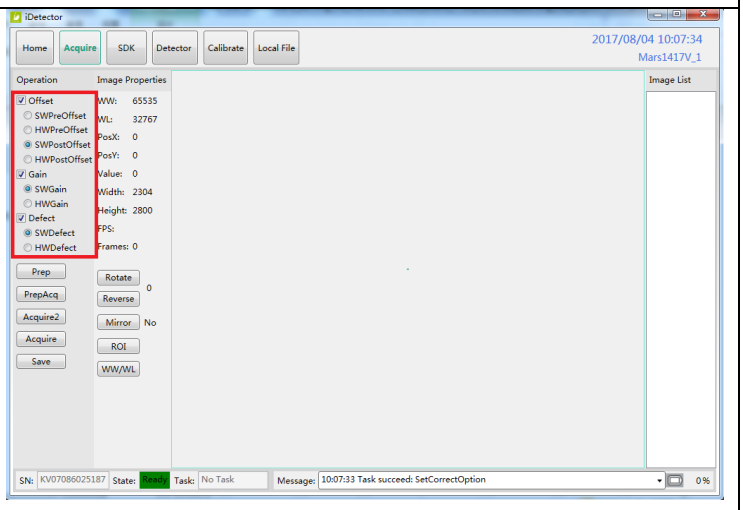
Panel supports correction and calibration template storage. So template in panel could be uploaded to Workstation, and template in Workstation could also be downloaded to panel.

Click “DownLoadFile” on “Detector” page, user can synchronized the template to the detector	

Choose the specified template, type “1” in the blank of FileIndex Click “OK”	
When success information occurs, it indicates that the process is finish	
Click “ReadStatus”, check if the template is enabled on “Gain” or “Defect” page	

4.7.2 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.

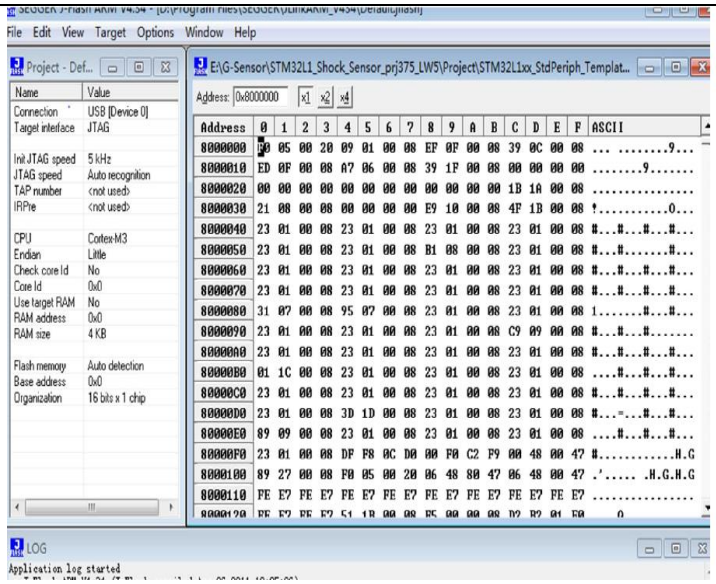
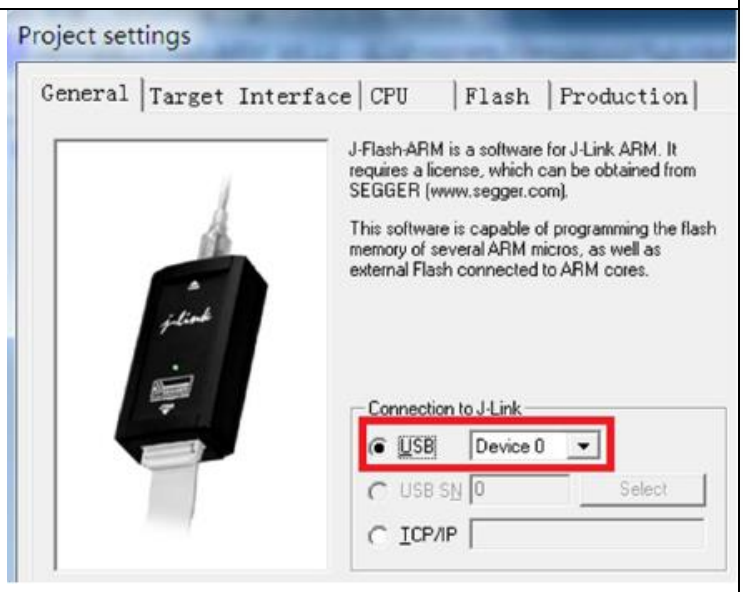
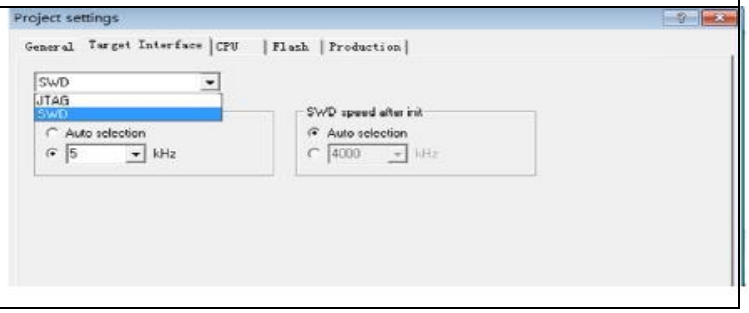
User can set the calibration method on “Detector” page	
Choose “HWPostOffset”, “HWGain”, “HWDefect”, the hardware-based calibration is on If the detector is set as the PrepMode and Acq2, the Offset should be set as HWPreOffset	
Choose “SWPostOffset”, “SWGain”, “SWDefect”, the software-based calibration is on If the detector is set as the PrepMode and Acq2, the Offset should be set as HWPreOffset	

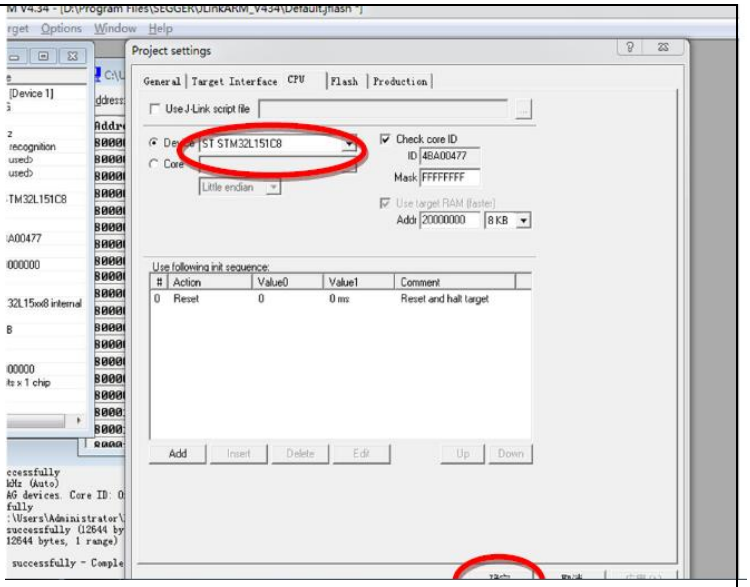
4.8 Firmware Update

Panel supports updating firmware with IDetector, also allows the use of the Web way to upgrade the firmware, if a user needs to update the firmware, please complete the following steps.

4.8.1 MCU Update

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

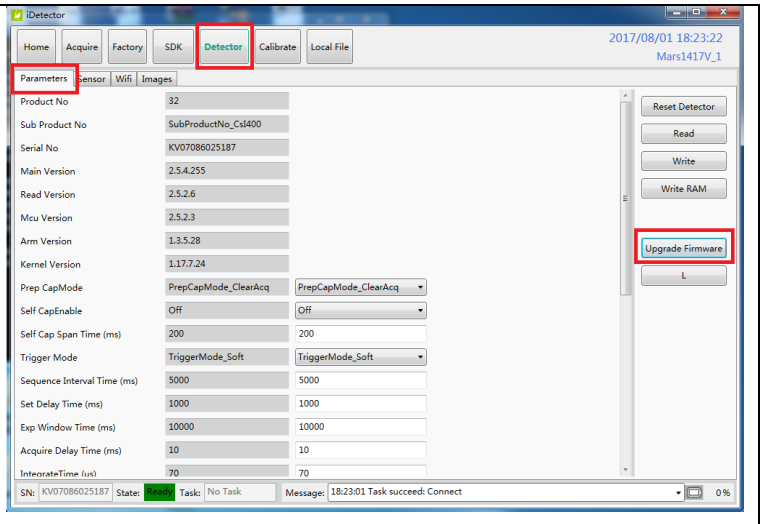
Open “mini Cover”	/
Remove original Ethernet cable, insert J-link download cable	/
Start J-flash ARM	/
Click “file->open data file”	
Click “option->project setting”, Set “connection to J-link” USB mode	
Click “Target Interface”, Choose “SWD”	

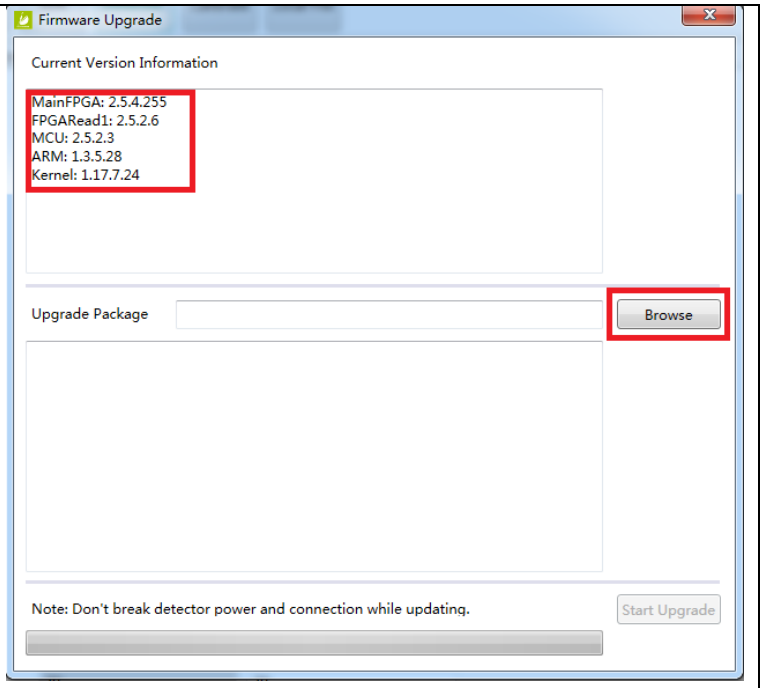
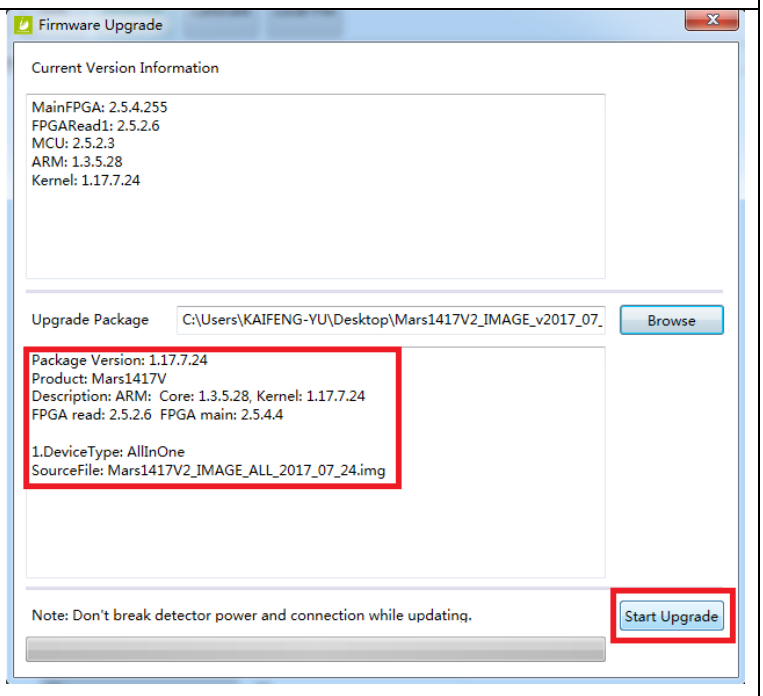
Click “ CPU”; Select “ST STM32L151C8”;	
Click “Target->Connect”	/
Click “Target-> Erase”	/
Click “Target->Program”	/
Click “Target->Start Application”	/

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.

4.8.2 Firmware Update

After connecting the detector, click the “Parameters” page in “Detector” User can enter the upgrade UI by clicking “Upgrade Firmeare” button	

The dialog box shows the version of the current firmware Click “Browse” to choose the firmware file to upgrade, the extension of the file is .ifirm	
After choosing the file, the lower dialog box shows the version of the new firmware, user should check the information and click “Start Upgrade” After the upgrade process is finished, power-cycle the detector	

Note:

1. 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.
2. There is a progress bar for indication. Make sure battery is inserted and battery capacity is over 25%
3. Please make sure that iDetector shows “ Ready”. It can also be checked by click “Config” button, there is firmware version.

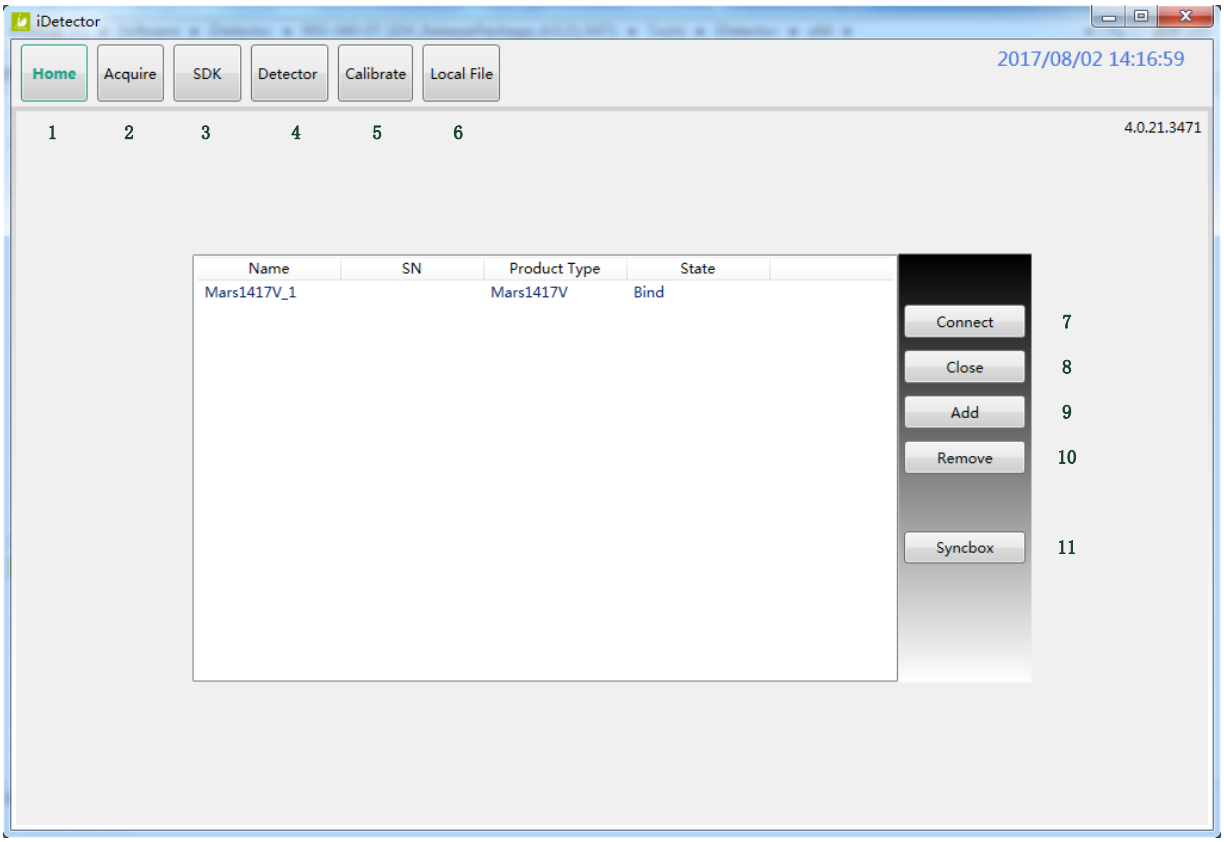
4.9 Short cut

iDetector 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:32767/WW:65535.
- 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.

4.10 Software

4.10.1 Main GUI



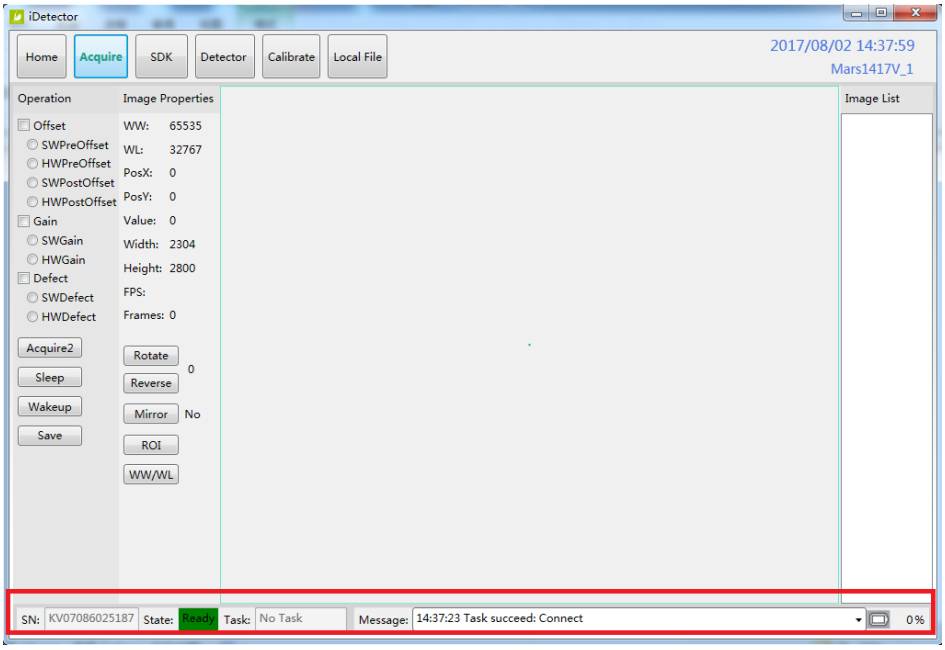
iRay provides test tools, such as iDetector for testing the basic performance of detector. It can connect the detector, acquire image, image correct and calibrate.

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

1	Home	Home page, shows the list of the detectors
2	Acquire	Acquire images, free for use after connecting the detector
3	SDK	Configure UI for SDK, free for use after connecting the detector
4	Detector	Configure UI for detector, free for use after connecting the detector
5	Calibrate	Calibration UI, for generation and management of the calibration template
6	Local File	Image management, free for use at any time
7	Connect	Button for connecting the detector
8	Close	Button for disconnecting the detector
9	Add	Button for add the instance for one detector
1	Remove	Button for delete the instance for one detector
1	Syncbox	Management for syncbox

4.10.2 Message Box

4.10.2.1 Status Box



Status box defines the current status of panel.

SN	Serial Number of the detector
Status	Status of the detector, busy or ready
Task	The current task being executed
Message	Information
	Remaining power of the battery, showed as percentage

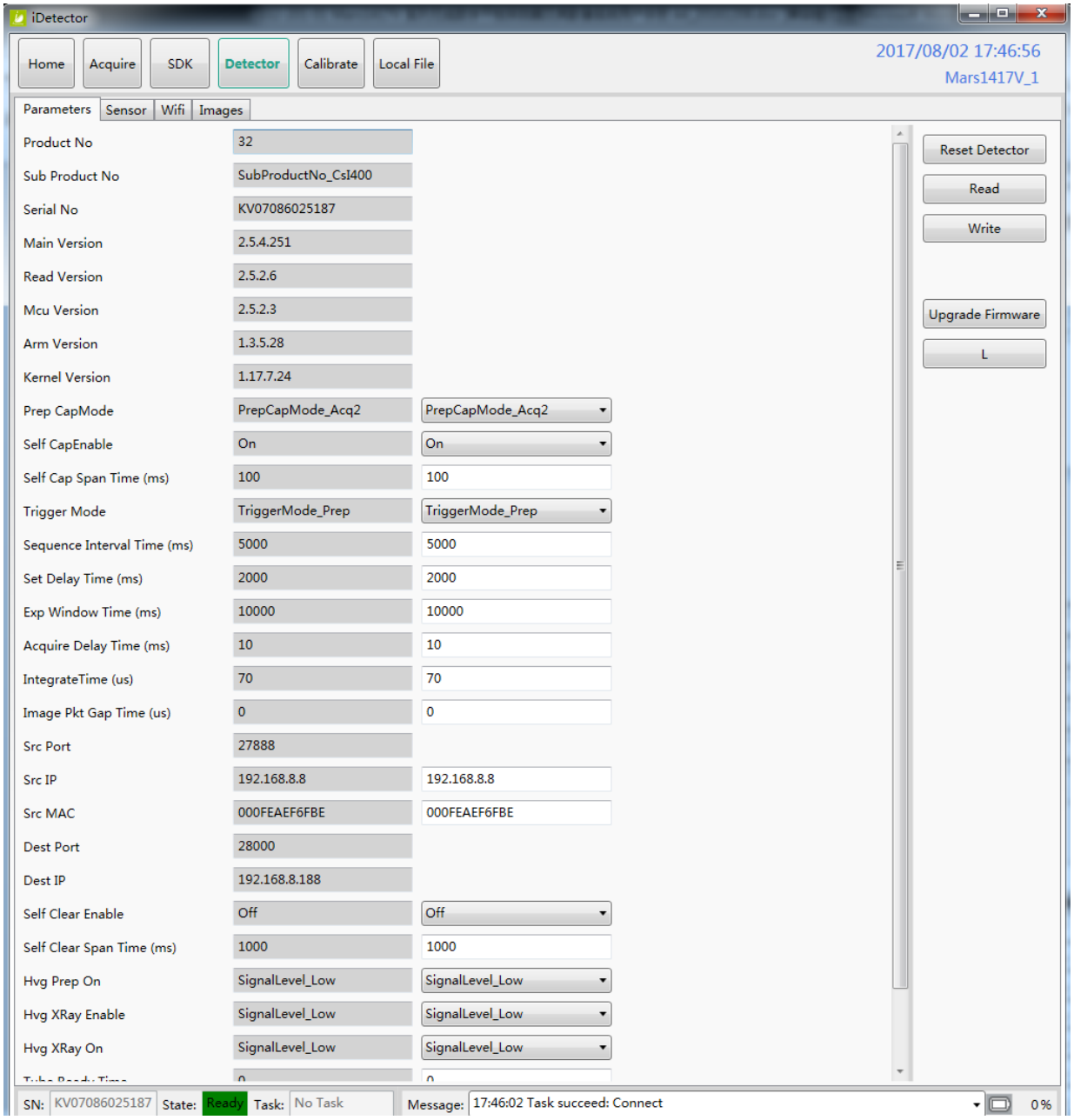
4.10.2.2 Progress Bar

Progress Bar defines as following.

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

4.10.3 Configuration GUI

4.10.3.1 General Settings



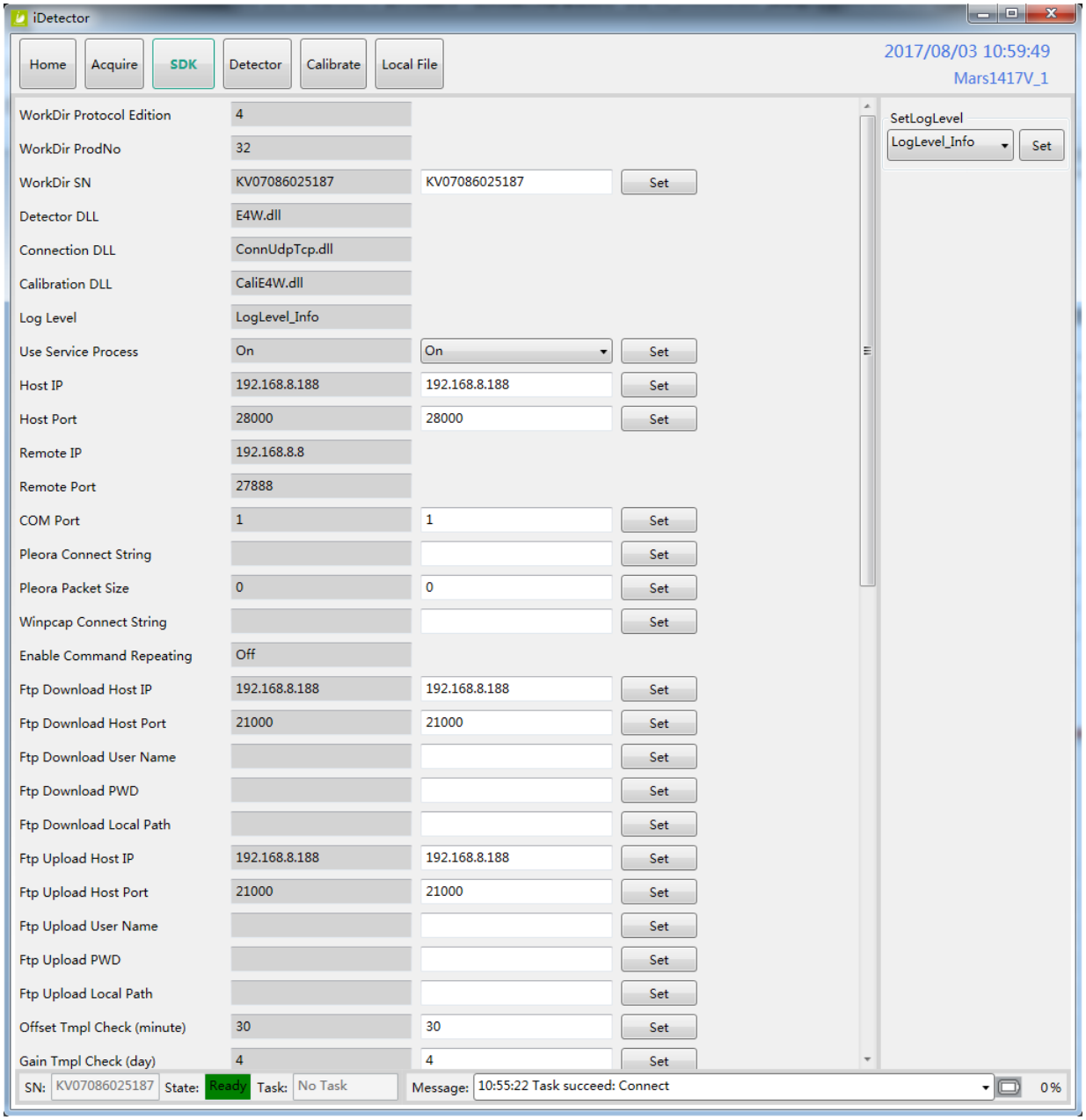
Except the following parameters, the value should not be modified for other parameters.

Description		Modify
Product No	Type number of the detector	NO
Sub Product No	Sub-type of the detector	NO

Serial No	Serial number of the panel	NO
Main Version	Version of the firmware of Main FPGA	NO
Read Version	Version of the firmware of Read FPGA	NO
MCU Version	Version of the firmware of MCU	NO
Arm Version	Version of the App of ARM	NO
Kernel Version	Version of the Kernel of ARM	NO
Prep CapMode	Sub work-flow for Prep Mode, can be configured as PrepCapMode_Acq2 only when Tirgger Mode configured as TriggerMode_Prep	Yes
Self CapEnable	Related to parameter Prep CapMode, the value should be “On” when Prep CapMode is configured as PrepCapMode_Acq2, while parameter Self Clear Enable configured as “Off”	YES
Self Cap Span Time	Should not be modified, and keep the original value	YES
Trigger Mode	Trigger mode	YES
Sequence Interval Time	Should not be modified, and keep the original value	YES
Set Delay Time	Exposure window for Freesync mode	YES
Exp Window Time	Exposure Window for Software/Inner mode, the value should not be large than 10s	YES
Acquire Delay Time	Used in Inner mode, the value is related to the HVG	YES
Integrate Time	Should not be modified, and keep the original value	YES
Src Port	Port number for detector	NO
Src IP	IP address for detector	YES
Src MAC	MAC address for detector	YES
Dest Port	Port number for PC	NO
Dest IP	IP address for detector	NO

Self Clear Enable	Related to Prep CapMode, the value should be configured as “On” if Prep CapMode is configured as PrepCapMode_ClearAcq, otherwise should be “Off” If the Trigger Mode is Software/Inner, the value should be “On”	YES
Self Clear Span Time	Should not be modified, and keep the original value	YES
Hvg Prep On	Reserved	YES
Hvg XRay Enable	Reserved	YES
Hvg XRay On	Reserved	YES
Tube Ready Time	Reserved	YES
Image Pkg Gap Time	Reserved	YES
Out Mode Cap Trigger	Reserved	YES

4.10.3.2 SDK Settings

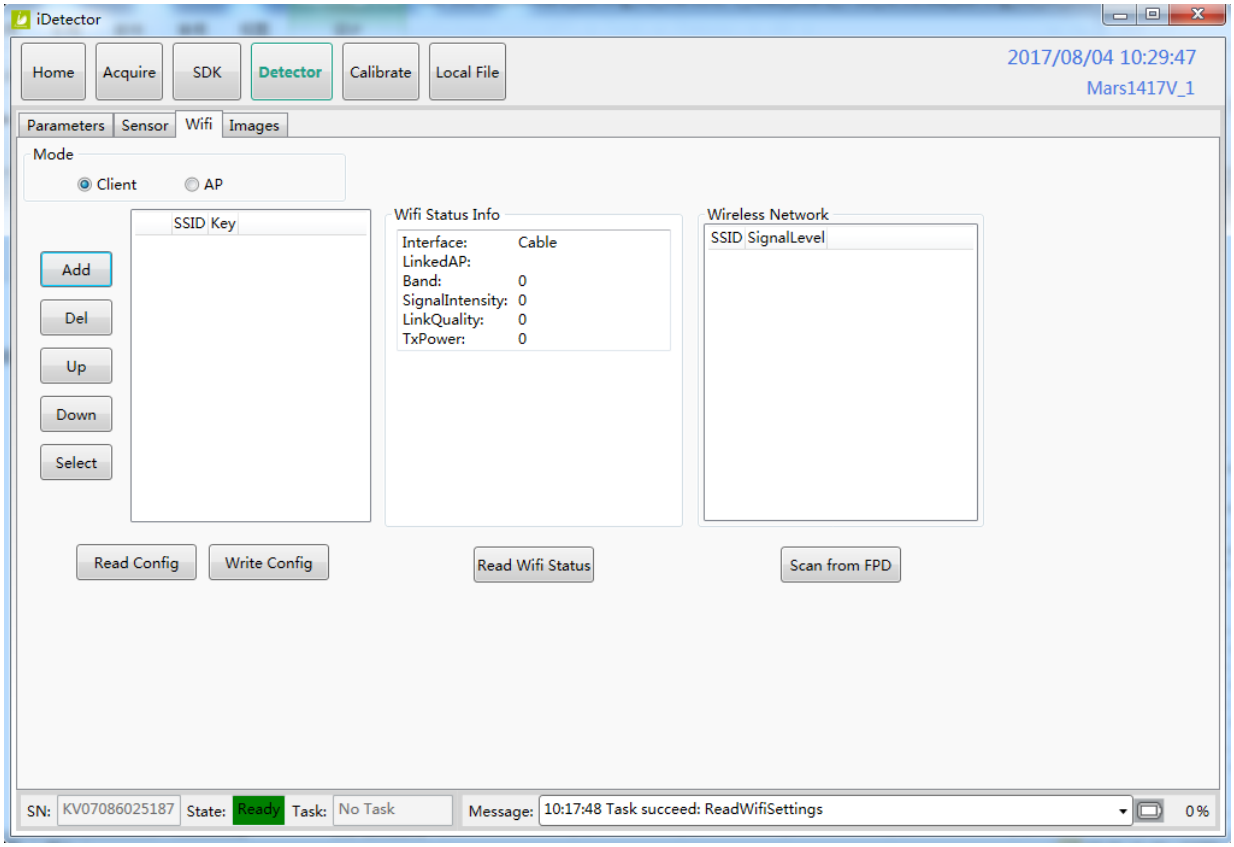


Only the following parameters need to be concerned

Description		Modify
Host IP	IP Address of local workstation	YES
Host Port	Port of local workstation	YES
Ftp Download Host IP	FTP download server IP, keep the same as Host IP	YES
Ftp Download Host Port	FTP download server Port, keep the same as Host Port	YES

Ftp Upload Host IP	FTP upoload server IP, keep the same as Host IP	YES
Ftp Upload Host Port	FTP upload server Port, keep the same as Host Port	YES
Clr Acq Delay Time	Exposure window for Acq2 work-flow of Prep trigger mode	NO

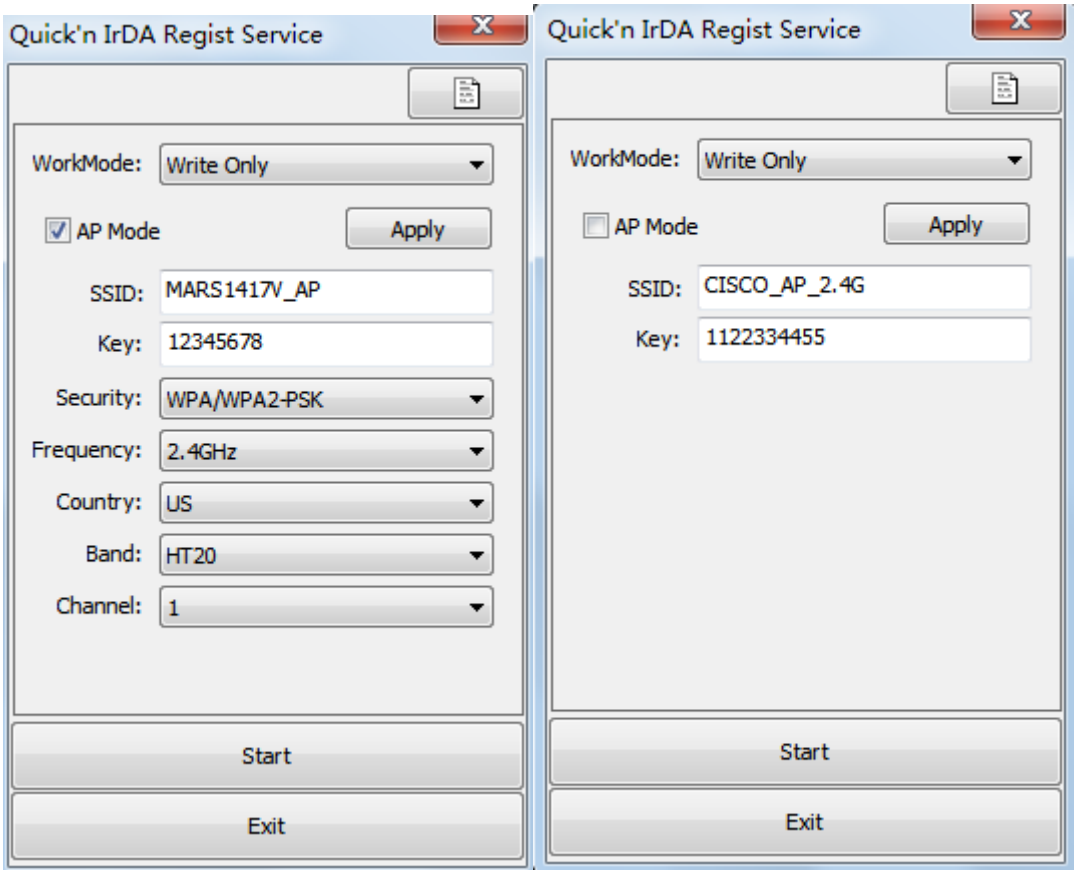
4.10.3.3 Network Settings



Description		Modify
Add	Add the information of SSID and Key of the AP	/
Del	Delete the information of SSID and Key of the AP	/
Up	Move up the AP information	/
Down	Move down the AP information	/
Select	Select the AP	/

Read Config	Read the parameters of the AP information when the detector is set as AP	/
Write Config	Write the parameters of the AP information when the detector is set as AP	/
Read Wifi Status	Read the wifi status of the current detector	/
Scan from FPD	Scan the AP	/

4.10.4 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	YES

		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	
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

4.11 List of the HAZARDOUS SITUATIONS resulting from a failure of the IT-NETWORK

1) The operating system is not compatibility;
2) Change or update the software failed;
3) The compatibility of the interface;
4) The data transfer protocol error;

5) The inconsistent of interface or format leads to data distortion;

6) The data output failed;

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 (medical approved adaptor) Internal electrical power source equipment (battery)
Degree of protection against electrical shock	Type-B applied part
Degree of protection against ingress of water	IPX1
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
IEC 60601-1:2005+ Amendment 1:2012/EN 60601-1:2006+ Amendment 1:2013	Medical electrical equipment -- Part 1: General requirements for basic safety and essential performance
IEC 60601-1-2:2014/EN60601-1-2:2015	Medical electrical equipment – Part 1-2: General requirements for basic safety and essential performance – Collateral standard: Electromagnetic disturbances – Requirements and tests
IEC 60601-1-3:2008/EN 60601-1-3:2008	Medical electrical equipment – Part 1-3: Collateral standard: General requirements for radiation protection in diagnostic X ray equipment
IEC 60601-2-54:2015/EN	Medical electrical equipment -- Part 2-54: Particular requirements for

60601-2-54:2015	the basic safety and essential performance of X ray equipment for radiography and radioscopy
IEC 62133:2012	Secondary cells and batteries containing alkaline or other non-acid electrolytes – Safety requirements for portable sealed secondary cells, and for batteries made from them, for use in portable applications
IEC 62220-1:2003EN 62220-1:2004	Medical electrical equipment - Characteristics of digital X-ray imaging devices - Part 1: Determination of the detective quantum efficiency
EN 62304:2006/AC:2008	Medical device software - Software life-cycle processes
IEC 62366-1:2015/IEC 62366:2007/EN 62366:2008	Medical devices –part 1: Application of usability engineering to medical devices
EN ISO14971: 2012	Medical device – Application of risk management to medical devices
ANSI/AAMI ES60601-1:2005+ Amendment 1:2012+ Amendment 2:2010	Medical Electrical Equipment – Part 1: General requirements for safety and essential performance
CSA CAN/CSA-C22.2 NO. 60601-1:14-2014	Medical Electrical Equipment – Part 1: General requirements for safety and essential performance
ISO 15223-1:2016/ EN ISO 15223-1:2016	Medical devices—Symbols to be used with medical device labels, labeling and information to be supplied—Part 1: General requirements

5.2 The compliance for each EMISSIONS and IMMUNITY standard or test specified by IEC60601-1-2 standard

EMI Compliance Table

Emission

Phenomenon	Compliance	Electromagnetic environment
RF emissions	CISPR 11 Group 1, Class B	Professional healthcare facility environment
Harmonic distortion	IEC 61000-3-2 Class A	Professional healthcare facility environment

Voltage fluctuations and flicker	IEC 61000-3-3 Compliance	Professional healthcare facility environment

EMS Compliance Table

Enclosure Port

Phenomenon	Basic EMC standard	Immunity test levels
		Professional healthcare facility environment
ElectrostaticDischarge	IEC 61000-4-2	±8 kV contact ±2kV, ±4kV, ±8kV, ±15kV air
Radiated RF EM field	IEC 61000-4-3	3V/m 80MHz-2.7GHz 80% AM at 1kHz
Proximity fields from RF wireless communications equipment	IEC 61000-4-3	Refer to table “Proximity fields from RF wireless communications equipment”
Rated power frequency magnetic fields	IEC 61000-4-8	30A/m 50Hz or 60Hz

Proximity fields from RF wireless communications equipment

Test frequency (MHz)	Band (MHz)	Immunity test levels
		Professional healthcare facility environment
385	380-390	Pulse modulation 18Hz, 27V/m
450	430-470	FM, ±5kHz deviation, 1kHz sine, 28V/m
710	704-787	Pulse modulation 217Hz, 9V/m
745		
780		

810	800-960	Pulse modulation 18Hz, 28V/m
870		
930		
1720	1700-1990	Pulse modulation 217Hz, 28V/m
1845		
1970		
2450	2400-2570	Pulse modulation 217Hz, 28V/m
5240	5100-5800	Pulse modulation 217Hz, 9V/m
5500		
5785		

Input a.c. power Port

Phenomenon	Basic EMC standard	Immunity test levels
		Professional healthcare facility environment
Electrical fast transients/burst	IEC 61000-4-4	±2 kV 100kHz repetition frequency
Surges Line-to-line	IEC 61000-4-5	±0.5 kV, ±1 kV
Surges Line-to-ground	IEC 61000-4-5	±0.5 kV, ±1 kV, ±2 kV
Conducted disturbances induced by RF fields	IEC 61000-4-6	3V, 0.15MHz-80MHz 6V in ISM bands between 0.15MHz and 80MHz 80%AM at 1kHz
Voltage dips	IEC 61000-4-11	0% UT; 0.5 cycle At 0º, 45º, 90º, 135º, 180º, 225º, 270º and 315º
		0% UT; 1 cycle and

		70% UT; 25/30 cycles Single phase: at 0º
Voltage interruptions	IEC 61000-4-11	0% UT; 250/300 cycles

Input d.c. power Port

Phenomenon	Basic EMC standard	Immunity test levels
		Professional healthcare facility environment
Electrical fast transients/burst	IEC 61000-4-4	±2 kV 100kHz repetition frequency
Conducted disturbances induced by RF fields	IEC 61000-4-6	3V, 0.15MHz-80MHz 6V in ISM bands between 0.15MHz and 80MHz 80%AM at 1kHz

Signal input/output parts Port

Phenomenon	Basic EMC standard	Immunity test levels
		Professional healthcare facility environment
Electrostatic Discharge	IEC 61000-4-2	±8 kV contact ±2kV, ±4kV, ±8kV, ±15kV air
Electrical fast transients/burst	IEC 61000-4-4	±1 kV 100kHz repetition frequency
Conducted disturbances induced by RF fields	IEC 61000-4-6	3V, 0.15MHz-80MHz 6V in ISM bands between 0.15MHz and 80MHz 80%AM at 1kHz

The following shows information on reference cables provided against EMC

Cable	Recommended cable length	Shielded or Unshielded	Number	Cable classification
AC Power Cable	3m	Unshielded	1 pcs	AC Power
DC Power Cable	3.5m	Unshielded	1 pcs	DC Power
LAN Cable (configuration mode)	3m	Shielded	1 pcs	Signal

◆ Important information regarding Electromagnetic Compatibility (EMC)

Mars1717V 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. Mars1717V 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.

Mars1717V conforms to this EN60601-1-2:2015 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 Mars1717V 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)

1.3.1 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	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

6. Trouble Shooting

Please refer to service manual. If the problem persists, turn off the panel and contact iRay service department (***service@iraychina.com***). We would provide the best service.

7. Service Information

7.1 Product Lifetime

The estimated product lifetime is up to 5 years under appropriate regular inspection and maintenance.(battery 5 years)

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, contact your sales representative or local iRay dealer for repairs. Please refer to the label and provide the following information:

Product Name:

Series Number:

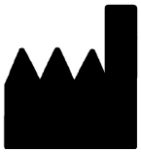
Description of Problem: as clearly as possible.

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.

Appendix

Appendix A Information of Manufactures



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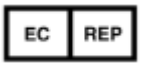
Appendix B Information of Medical Device Directive European Representative



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