

Wireless Digital Wireless Digital Flat Panel Detector

Mars1417X

User Manual



Version : A1

Doc ID : 042-201-02

Release Date: : 2020.09.01

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

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



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

Congratulations on your purchase of the Wireless Digital Flat Panel Detector (hereinafter referred to as Mars1417X) which is manufactured by iRay Technology Company Ltd. (Hereinafter referred to as iRay).

Please take time to read through this user guide in order to utilize the product effectively. We hope you enjoy the experience with iRay Mars1417X.

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

Notes on usage and management of the equipment

1. Read all of the instructions in the user guide before your operation. Give particular attention to all safety precautions.
2. Only a physician or a legally certified operator should use this product.
3. The equipment should be maintained in a safe and operable condition by maintenance personnel.
4. 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.
5. Use only the dedicated cables. Do not use any cables other than those supplied with this product.
6. 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

1. iRay shall not be liable to the purchaser of this product or third parties for any damage, loss, or injury incurred by purchaser or third parties as a result of fire, earthquake, any accident, misuse or abuse of this product.
2. 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.
3. iRay shall not be liable for any damage or loss arising from the use of any options or consumable products other than those dedicated as Original iRay Products by iRay Technology.
4. 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.

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

Copyright

All rights reserved








No part of this publication may be reproduced in any form or by any means without the written permission of iRay. The information contained herein is designed only for use with iRay Mars1417X.

Trademarks

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












Symbols and Conventions




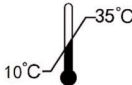
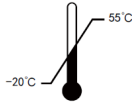






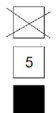
The following symbols and conventions are used throughout the user guide.

	Identify the conditions under which improper use of the product may cause death or serious personal injury.
	Identify conditions under which improper use of the product may cause minor personal injury.
	Identify conditions under which improper use of the product may cause property damage.
	Indicate a prohibited operation.
	Indicate an action that must be performed
	Indicate important operations and restrictions.
	Indicate operations for reference and complementary information.

Labels and markings on the equipment

The contents of the label and mark on iRay Mars1417X product are indicated as below:

Symbol	Description
	Caution: please refer to the instructions in the user manual.
	Indicates that the equipment has passed CE testing and the CE Notified Body number follows it.
	Serial number of the product.
	Name and address of the manufacturer.
	Manufacturing date of this product.
	Expiring date of this product.
	This symbol is used to indicate non-ionized electromagnetic radiation.
	Name and address of iRay authorized representative in the European region.
	Consultation of the user guide for general information.
	This product is not to be disposed of with your residential or commercial waste.
	Safety Signs: Please refer to the user guide for safety instructions.

	B Type.
	Load limit. (Central area)
	Handled with care.
	Operational temperature limits.
	Storage temperature limits.
	Fragile
	Keep away from sunlight
	Keep dry
	Humidity limits.
	Keep the equipment up right.
	Do not roll the transportation package.
	Stacking limit number.
IP	IP56 for working surface only
Rx only	Detector symbol : device is for prescription use only

Contents


CONTENTS	8
1. SAFETY INFORMATION	9
1.1. Safety Precautions	10
1.2. Notes for Using	20
2. GENERAL DESCRIPTION	22
2.1. Product Description	23
2.2. Principle	23
2.3. Scope	24
2.4. Characteristics	24
2.5. Intended Use	24
2.6. Environment	29
2.7. Product Components	29
2.8. Specification	31
3. BASIC OPERATION	33
3.1. Preparation	34
3.2. Routine Operation	35
3.3. Battery Charger Installation	37
4. SOFTWARE SETUP	38
4.1. System requirement	39
4.2. Environment setup	39
4.3. Wired Connection (for setting&maintenance)	39
4.4. Software UI	43
4.5. List of the HAZARDOUS SITUATIONS resulting from a failure of the IT-NETWORK	64
5. OPERATION INSTRUCTIONS FOR IMAGE ACQUISITION	65
5.1. Steps for acquiring image	66
5.2. Software Mode	66
5.3. AED Mode	68
5.4. After use	70
5.5. Firmware Upgrade	70
6. REGULATORY INFORMATION	73
6.1. Medical Equipment Safety Standards	74
6.2. Guidance and Manufacture's Declaration for EMC	75
6.3. Radio Frequency Compliance Information	78
6.4. Battery Safety Standards	81
6.5. Product Label	81
7. TROUBLE SHOOTING	85
8. SERVICE INFORMATION	86
8.1. Service Office Information	87
8.2. Product Lifetime	87
8.3. Regular Inspection and Maintenance	87
8.4. Repair	87
8.5. Replacement Parts Support	88
APPENDIX A INFORMATION OF MANUFACTURES	90
APPENDIX B INFORMATION OF EUROPE REPRESENTATIVE	91


1. Safety Information



1.1. Safety Precautions	10
1.2. Notes for Using.....	20


1.1. Safety Precautions



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

WARNING	
<div>Installation and environment of use</div> <div> Prohibited</div>	<p>Do not use or store the equipment near flammable chemicals such as alcohol, thinner, benzene, etc.</p> <p>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.</p> <p>Do not connect the equipment with anything other than specified.</p> <p>Doing so may result in fire or electric shock.</p> <p>All the patients with active implantable medical devices should be kept away from the equipment.</p>


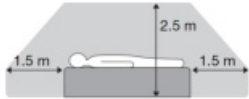
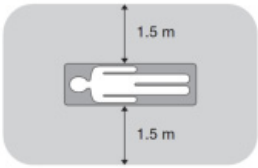
<p>Power supply</p>  <p>Prohibited</p>	<p>Do not operate the equipment using any type of power supply other than the one indicated on the rating label.</p> <p>Otherwise, it may result in fire or electric shock.</p> <p>Do not handle the equipment with wet hands.</p> <p>You may experience electric shock that could result in death or serious injury.</p> <p>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.</p> <p>Doing so may damage the cords, which could result in fire or electric shock.</p> <p>Do not supply power to more than one piece of equipment using the same AC outlet.</p> <p>Doing so may result in fire or electric shock.</p> <p>Do not turn ON the system power when condensation has formed on the equipment.</p> <p>Doing so may result in fire or electric shock.</p>
---	---



<div>Power supply</div> <div><div>Prohibited</div></div>	<div>Do not connect a multiple portable socket-outlet or extension cord to the system.</div> <div>Doing so may result in fire or electric shock.</div> <div>To avoid the risk of electric shock, this equipment must only be connected to power supply with protective earth.</div> <div>Not doing so may result in fire or electric shock.</div>
<div></div>	<div>Securely plug the power cord into the AC outlet.</div> <div>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.</div> <div>Be sure to turn OFF the power to each piece of equipment before connecting or disconnecting the cords.</div> <div>Otherwise, you may get an electric shock that could result in death or serious injury.</div> <div>Be sure to hold the plug or connector to disconnect the cord.</div> <div>If you pull the cord, the core wire may be damaged, resulting in fire or electric shock.</div>
<div>WARNING</div>	

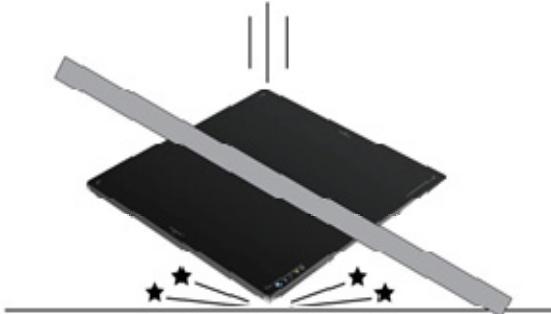
<p>Handling</p>  <p>Prohibited</p>	<p>Never disassemble or modify the equipment. No modification of this equipment is allowed. Parts of the Mars1417X that are not serviced or maintained while in use with the patient.</p> <p>Doing so may result in fire or electric shock. Also, since the equipment incorporates parts that may cause electric shock as well as other hazardous parts, touching them may cause death or serious injury.</p> <p>Do not place anything on top of the equipment.</p> <p>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.</p> <p>Do not hit or drop the equipment.</p> <p>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.</p> <p>Do not put the equipment and pointed objects together.</p> <p>The equipment may be damaged. If so, the equipment should be used in bucky.</p>
	<p>Have the patient take a fixed posture and do not let the patient touch parts unnecessarily.</p> <p>If the patient touches connectors or switches, it may result in electric shock or malfunction of the equipment.</p>

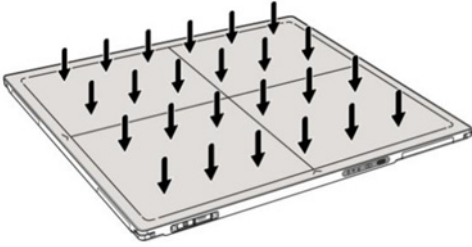
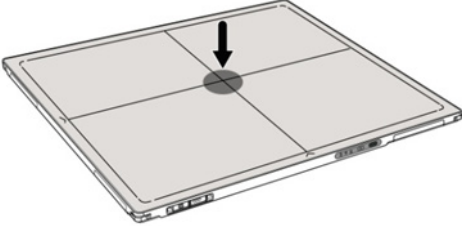

<p>When a problem occurs</p>	<p>Should any of the following occurs, immediately unplug the power cord of Control Box, and contact your sales representative or local iRay dealer:</p> <p>When there is smoke, an odd smell or abnormal sound.</p> <p>When liquid has been spilled into the equipment or a metal object has entered through an opening.</p> <p>When the equipment has been dropped and damaged.</p>
<p>Maintenance and inspection</p> 	<p>Please turn OFF the power of the equipment and unplug the power cord of adaptor before cleaning.</p> <p>NEVER use alcohol, ether and other flammable cleaning agent for safety. NEVER use methanol, benzene, acid and base because they will erode the equipment.</p> <p>DON'T dip the equipment into the liquid.</p> <p>Please make sure that the equipment's surface & plugs are dry before turning ON.</p> <p>Otherwise, it may result in fire or electric shock.</p>
	<p>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.</p> <p>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.</p>

	<p>For safety reasons, be sure to turn OFF the power to each piece of equipment when performing inspections indicated in this manual.</p> <p>Otherwise, electric shocks may occur.</p>
CAUTION	

<div>Installation and environment of use</div> <div></div>	<div>Do not install the equipment in any of the locations listed below. Doing so may result in failure, malfunction, equipment falling, fire or injury.</div> <div>Close to facilities where water is used</div> <div>Where it will be exposed to direct sunlight</div> <div>Close to the air outlet of an air-conditioner or ventilation equipment</div> <div>Close to heat source such as a heater</div> <div>Where the power supply is unstable</div> <div>In a dusty environment</div> <div>In a saline or sulfurous environment</div> <div>Where temperature or humidity is high</div> <div>Where there is freezing or condensation</div> <div>In areas prone to vibration</div> <div>On an incline or in an unstable area</div> <div>Take care that cables do not become tangled during use. Also, be careful not to get your feet caught by cable.</div> <div>Otherwise, it may cause a malfunction of the equipment or injury of the user due to tripping over the cable.</div> <div></div>
---	--

 Power supply	<p>Always connect the three-core power cord plug to a grounded AC power outlet.</p> <p>To make it easy to disconnect the plug at any time, avoid putting any obstacles near the outlet.</p> <p>Otherwise, it may not be possible to disconnect the plug in an emergency.</p> <p>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.</p> <p>Do not use any power source other than the one provided with this equipment.</p> <p>Otherwise, fire or electric shock may be caused due to leakage.</p>
Handling 	<p>Do not spill liquid or chemicals onto the equipment.</p> <p>In case the patient is injured, it is not allowed to contact with blood or other body fluids.</p> <p>Doing so may result in fire or electric shock.</p> <p>In such a situation, protect the equipment with a disposable cover as necessary.</p> <p>Turn OFF the power and pull out the plug to each piece of equipment for safety when not used.</p>
CAUTION	

<p>Handling</p> <p>!</p>	<p>Handle the equipment carefully.</p>  <p>Do not submerge the equipment in water.</p> <p>The internal image sensor may be damaged if something hits against it or it is dropped.</p> <p>Do not place excessive weight on the equipment.</p> <p>Be sure to use the equipment on a protected foam.</p> <p>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.</p> <p>Keep the same load (same pressure) on the detector when acquiring the image. Or the image will be incorrect.</p> <ul style="list-style-type: none">● Do not place excessive weight on the panel.<p>Otherwise, the internal image sensor may be damaged and image may be incorrect.</p><p>Patients stand on the product temporarily, and the intended weight can be 135kg.</p><p>Based on the internal TFT character, cannot load the dynamic forces due to loading from persons</p><p><Load Limit></p><p>Uniform load : 300 kg over the whole area of the surface.</p>
--------------------------	--

	 <p>Local load : 150 kg on an area 4 cm diameter.</p> 
CAUTION	
 CAUTION	<p>Do not close to fire, do not use in high temperature</p> <p>Do not invert positive and negative pole</p> <p>Do not contact with metal in case of short circuit</p>

1.2. Notes for Using

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

Before exposure

- Be sure to check the connection of all the parts are set properly & check the detector is kept in insulated cover that operator or patient can't touch the detector directly before powered up.
- Be sure to check the product daily and confirm it work properly.
- Sudden heating of the room in cold areas will cause condensation on the product. In this case, wait until the condensation evaporates before performing an exposure. If it is used when condensation is formed, problems may occur in the quality of captured images. When an air-conditioner is used, be sure to raise/lower the temperature gradually to prevent condensation.
- The product should be warmed up for 15 minutes before exposure or updating the gain map and defect map.
- Make sure wave form of the energy going to the X ray tube is square not pulse.
- Be cautious with circumstance that someone has radio isotope recently injected into them, it may cause panel transmit image without x ray.
- Once powered off, please wait at least 60s before power on again

During exposure

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

After Usage

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

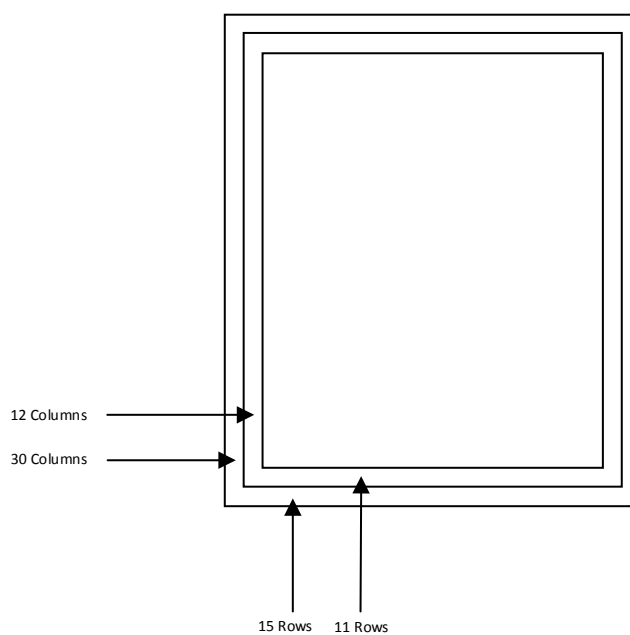
2. General Description

2.1. <i>Product Description</i>	23
2.2. <i>Principle</i>	23
2.3. <i>Scope</i>	24
2.4. <i>Characteristics</i>	24
2.5. <i>Intended Use</i>	24
2.6. <i>Environment</i>	29
2.7. <i>Product Components</i>	29
2.8. <i>Specification</i>	31

2.1. Product Description

Mars1417X is a cassette-size wireless X-ray Wireless Digital Flat Panel Detector based on amorphous silicon thin-film transistor technology. It is designed to provide the high quality radiography image which contains an active matrix of 3500×4300 with 100um pixel pitch, the TFT module has a pixel matrix of 3584*4352. There are 12 dummy columns for both right and left, 15 dummy rows for both top and bottom. Also, there are 30 unconnected columns for both right and left, and 11 unconnected rows for both top and bottom.

The scintillator of Mars1417X is CsI(Caesium Iodide) which is direct deposit. Since Mars1417X supports multiple trigger modes, it can satisfy both of the general DR system and retrofit DR system.



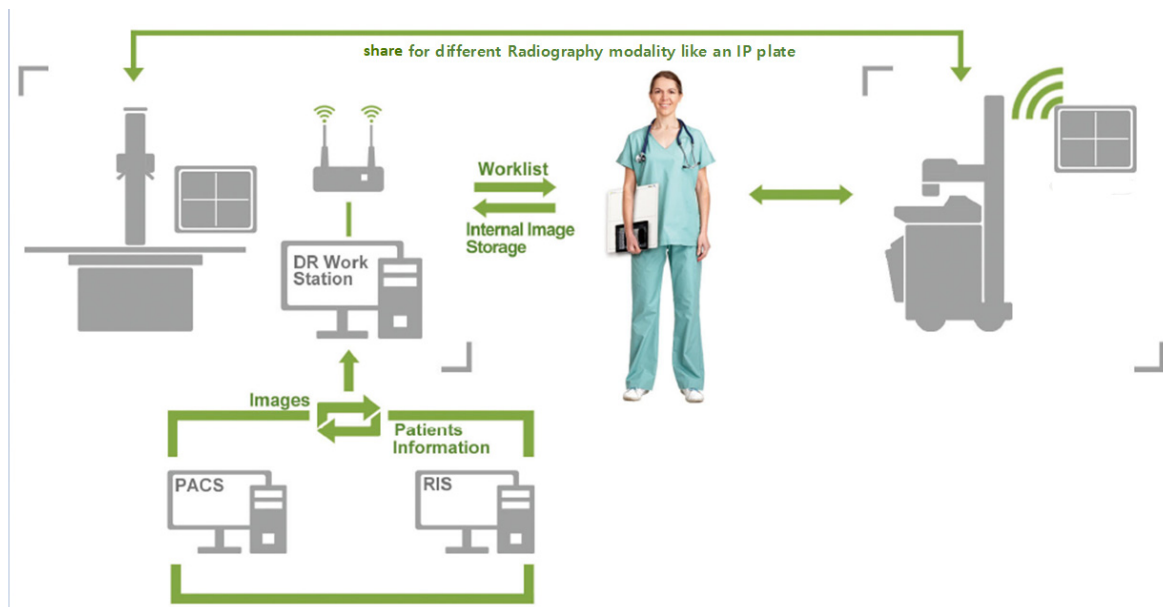
2.2. Principle

Detectors contain a layer of scintillator material, which converts the x-rays into light. Directly behind the scintillator layer is an amorphous silicon pixel array contains a photodiode which generates an electrical signal in proportion to the light produced by the portion of scintillator layer in front of the pixel. The signals from the photodiodes are amplified and encoded by additional electronics

positioned behind the sensor array in order to produce an accurate and sensitive digital representation of the x-ray image.

2.3. Scope

This manual contains information about iRay Mars1417X product. All operators must read and understand this manual before using equipment. All information in this manual, including the illustrations, is based on equipment prototype. If configuration of your equipment does not have any of these items, information about these items in the manual does not apply to your equipment.



2.4. Characteristics

- Wireless static Wireless Digital Wireless Digital Flat Panel Detector
- 14 inch ×17 inch
- Removable handle
- AED
- 802.11ac
- 16-bit AD

2.5. Intended Use

Mars1417X is indicated for digital imaging solutions designed to provide general radiographic diagnosis for human anatomy including both adult and pediatric patients. It is intended to replace film/screen systems in all general-purpose diagnostic procedures. The device is not intended for mammography or dental applications.

Suitable patient

It is suitable for providing digital X-ray imaging for DR system to provide general radiographic diagnosis for human anatomy including both adult and pediatric patients, but not intended for mammography or dental applications. The remaining notes depend on the DR system.

PATIENT population:

- Adult and pediatric patients
- Weight: not relevant
- Health: not relevant
- Nationality: multiple
- Patient state: patient is not user
- Gender: except for pregnant women

Pediatric Use: Guidance & Considerations

Special care should be exercised when imaging patients outside the typical adult size range, especially smaller pediatric patients whose size does not overlap the adult size range (e.g. less than 50 kg (110 lb) in weight and 150 cm (59 in) in height, measurements which approximately correspond to that of an average 12 year old.

The following ranges of pediatric subpopulations are to be used as a guide for manufacturers in developing medical devices:

Pediatric Subgroup	Approximate Age Range
Newborn (Neonate)	From birth to 1 month of age
Infant	Greater than 1 month to 2 years of age

Child	Greater than 2 to 12 years of age
Adolescent	Greater than 12 through 21 years of age

Exposure to ionizing radiation is of particular concern in pediatric patients because:

- 1) for certain organs and tumor types, younger patients are more radiosensitive than adults (the cancer risk per unit dose of ionizing radiation is higher for younger patients);
- 2) use of equipment and exposure settings designed for adults of average size can result in excessive and unnecessary radiation exposure of smaller patients;
- 3) younger patients have a longer expected lifetime putting them at higher risk of cancer from the effects of radiation exposure.

To help reduce the risk of excessive radiation exposure, you should follow the ALARA (As Low As Reasonably Achievable) principle and seek to reduce radiation dose to only the amount necessary to obtain images that are adequate clinically.

Additional guidance and recommendation are provided by the Alliance for Radiation Safety in Pediatric Imaging (Image Gently Alliance) <https://www.imagegently.org/>

Table 1 : Techniques for Typical Body Parts

Body Parts	Patient Size	kVp	mAs	SID	Grid
Abdomen AP/PA	Very Low Birth Weight (Less than 1.5Kg)	55	1	1m	No
	Low Birth Weight (Between 1.5 and 2.5Kg)	55	1.6	1m	No
	Newborn (Age is less than 1 month and Weight above than 2.5Kg)	70	1.6	1m	No

Body Parts	Patient Size	kVp	mAs	SID	Grid
Abdomen AP/PA	Infant (Age is between 1 month and 2 years)	73	2	1m	No
	Child (Age is between 2 years and 12 years)	75	7.1	1m	Yes
	Preadolescent (Age is between 12 years and 13 years)	75	14	1m	Yes
	Adolescent (Age is between 13 years and 21 years)	75	20	1m	Yes
	Adult Small	75	18	1m	Yes
	Adult Medium	80	22	1m	Yes
	Adult Large	85	32	1m	Yes
Chest PA/AP	Very Low Birth Weight	50	1	1m	No
	Low Birth Weight	55	1	1m	No
	Newborn	65	1	1m	No
	Infant	70	1.6	1m	No
	Child	70	1.6	1m	No
	Preadolescent	90	2	1m	Yes
	Adolescent	90	2	1m	Yes
	Adult Small	110	1.8	1.8m	Yes
	Adult Medium	110	2.8	1.8m	Yes
	Adult Large	120	4	1.8m	Yes
Extremities AP/PA	Very Low Birth Weight	50	1	1m	no
	Low Birth Weight	55	1	1m	no
	Newborn	57	1	1m	no
	Infant	57	1.2	1m	no
	Child	58	1.2	1m	no
	Preadolescent	62	1.6	1m	no
	Adolescent	62	2	1m	no
	Adult Small	Regarding adult details techniques of Extremities, please refer to the table "Techniques for Adult Extrimities"			no

Table 2: Techniques for Adult Extrimities

Adult Extemities List	kVp	mAs	SID	Grid
Ankle - AP	58	4	1m	no

Adult Extremities List	kVp	mAs	SID	Grid
Ankle – Lateral	58	4	1m	no
Femur – AP	70	16	1m	yes
Femur – Lateral	70	10	1m	yes
Hand - AP	53	1.8	1m	no
Hand – Lateral	53	1.8	1m	no
Humerus - AP	75	7.1	1m	yes
Humerus – Lateral	70	3.2	1m	yes
Knee - AP	65	10	1m	yes
Knee – Lateral	65	10	1m	yes
Wrist - PA	55	1.8	1m	no
Wrist – Lateral	55	1.8	1m	no

ESSENTIAL PERFORMANCE

According to the Mars1417X INTENDED USE and the result of risk management, image acquisition and data transmission are defined as ESSENTIAL PERFORMANCE.

Getting dark image proves that ESSENTIAL PERFORMANCE does not influence INTENDED USE. Method for getting dark image in detail refers to section “installation” and “operation”

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.

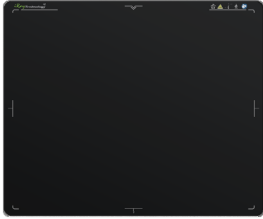


Life-time:

Life-time: 5 years without frequency limit

2.6. Environment

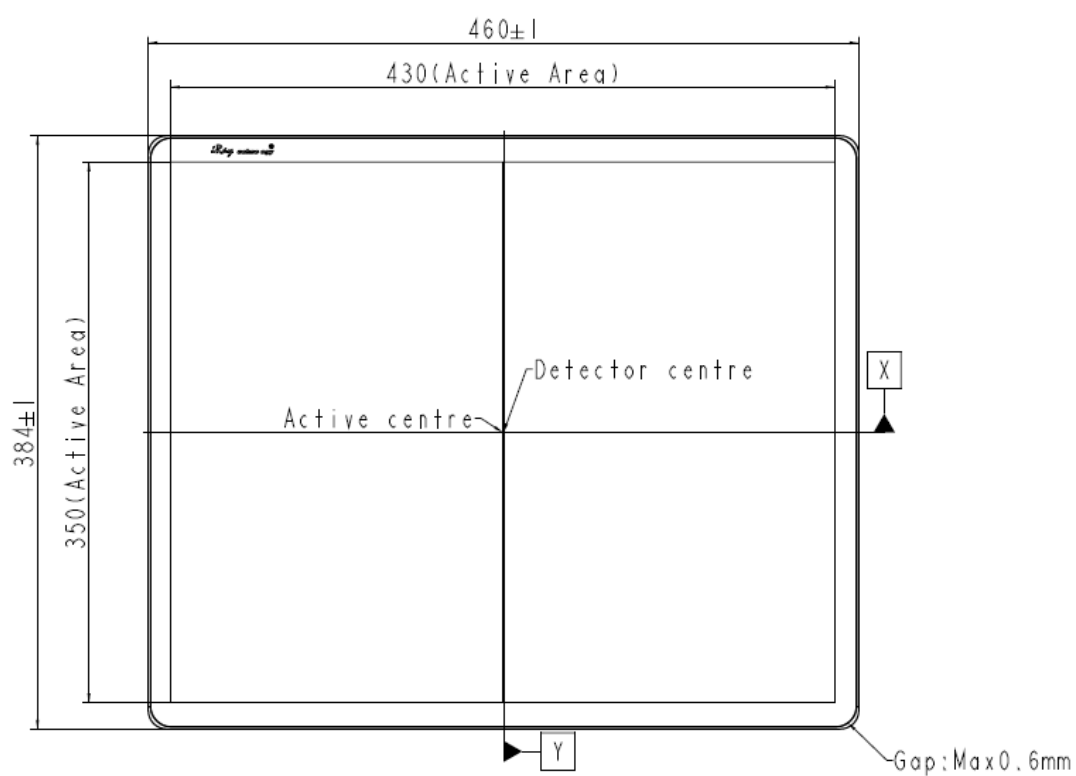
	Temperature	Humidity	Atmospheric Pressure
Operating	10~35°C	5~90% RH	700~1060mbar
Storage	-20~55°C	5~95% RH	600~1060mbar

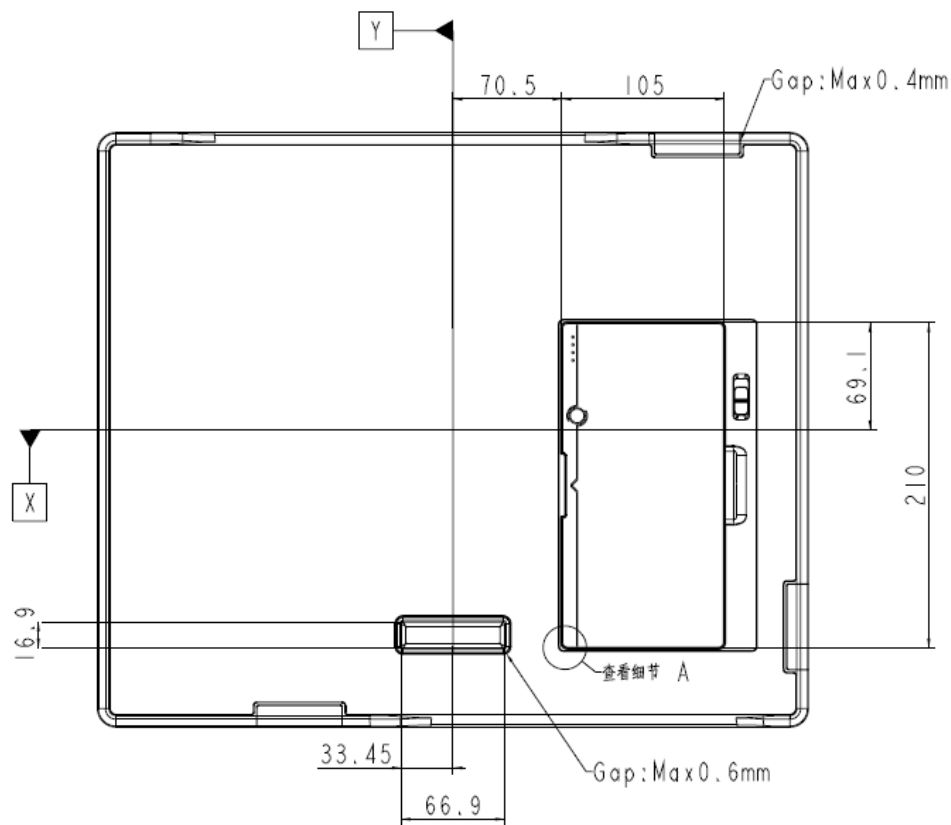
2.7. Product Components

Item	Picture	Description
Mars1417X Detector		1pcs
Medical Adapter		1pcs
AC Power Cable		1pcs

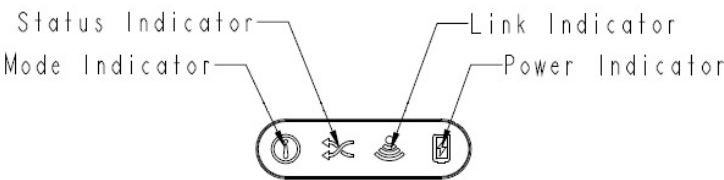
Gigabit Ethernet Cable		1pcs
------------------------	--	------

2.7.1. Detector





2.7.2. Indicator



2.8. Specification

2.8.1. Basic

Item	Specification
Model	Mars1417X
Image Sensor	a-Si (Amorphous Silicon) TFT
Scintillator	CsI
Pixel Size	100um

Fill Factor	60%
Effective Array	3500x4300
Effective Area (H x V)	35mm×43mm
Spatial Resolution	4.3 lp/mm
Image Transfer	WIFI
Full Image Time	<5s (with 1s XWin, from end of XWin)
Cycle Time	6s
Power Consumption	35W @ Full-Running 7.5W @ Idle
Dimension (L × W × H)	460mmx384mmx15mm @typ.
Weight	2.8kg(with battery)
X-ray Energy	40-150kV
Panel protection	IP56
Trigger Mode	Software/AED
SID	90-180cm

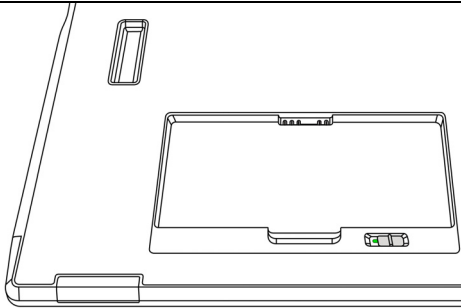
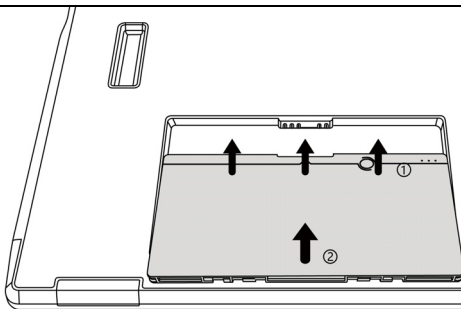
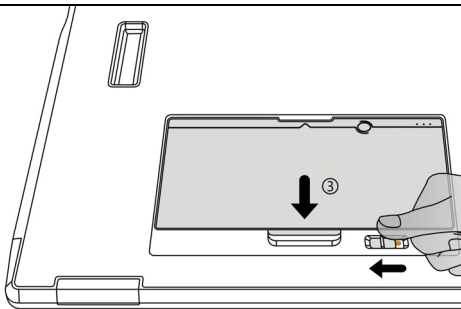
3. Basic Operation

3.1. <i>Preparation</i>	34
3.2. <i>Routine Operation</i>	35
3.3. <i>Battery Charger Installation</i>	37

3.1. Preparation

3.1.1. Attach Battery Pack

The product can be powered by both a battery pack and DC power. Once the battery pack is inserted or DC power is connected, detectors will be turned on immediately. If neither battery nor DC power is connected, panel will power off. Please see below for battery installation.

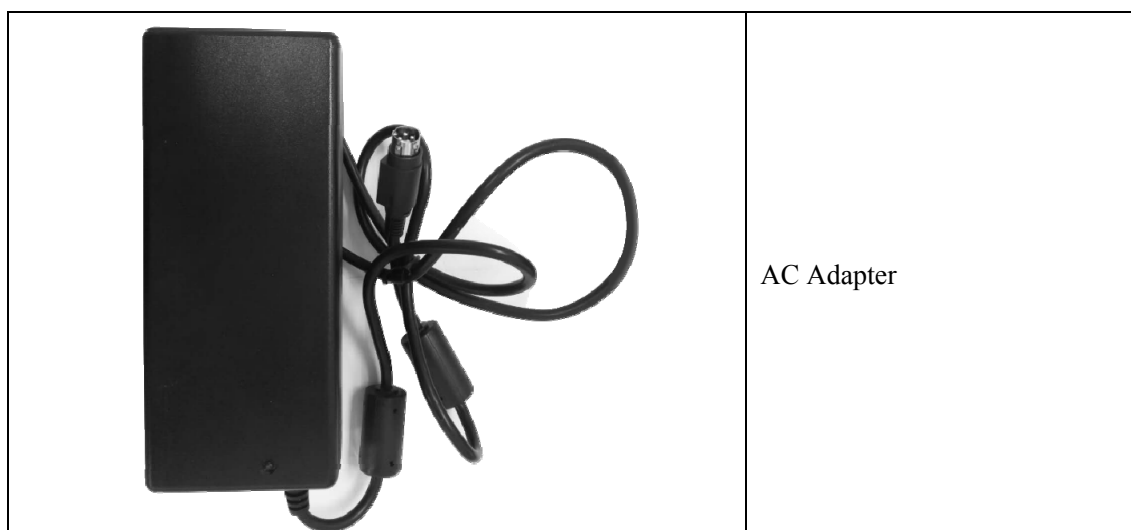
Make sure that connectors on the battery pack are pointed to the opening in the battery compartment.	
Slide battery package into battery compartment (Make sure battery capacity overpass is 15%).	
Slide the battery lock lever.	

3.1.2. Adapter

Detector supports an external adapter powered, It gets CB certificate No. SG PSB-MD-00005 and NRTL certificate No. U8V 093768 0016.The ports defined as bellow:

No	Definition	Voltage Range	Rated Current
P1	DC Power Negative	0~0.5V	0~0.42A
P2	DC Power Positive	23~25V	0~0.42A
P3	DC Power Positive	23~25V	0~0.42A
P4	DC Power Negative	0~0.5V	0~0.42A

In order to meet the safety and function requirements of the detector, standard components are recommended.

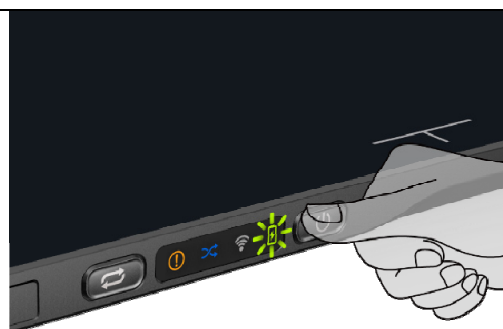


3.2. Routine Operation

3.2.1. Starting Up











On the control panel, users can press the power button to turn on.

When the detector is powered down, the user presses the button for 4 seconds to turn on the detector if the battery is inserted and the capacity is not less than 15%, or DC power is connected.






After booting up, users can check the indicator of the detector.



Power indicator:

Power Indicator	Lighting Status	Status		
		Battery Capacity	DC Input	Description
OFF		N/A	N/A	Detector is off
Green ON		N/A	YES	Detector is on
Orange Blinking	 	$\geq 7\% \text{ \& } < 15\%$	NO	Detector is on
Green Blinking	 	$\geq 15\% \text{ \& } < 95\%$	YES	Detector is on
Green&Orange Blinking	   	$< 95\%$	YES	Detector is off



Link indicator:


Link Indicator	Lighting Status	Description
OFF		Detector is turned off Wired connection broken and wireless connection not ready
Blue ON		Wireless connection is enabled
Green ON		Wired connection is enabled (Service Mode)

Mode indicator:

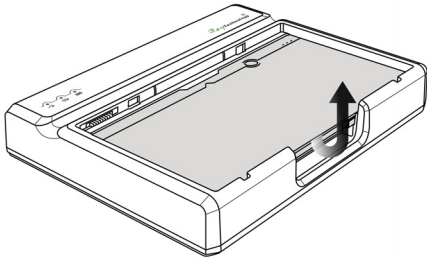
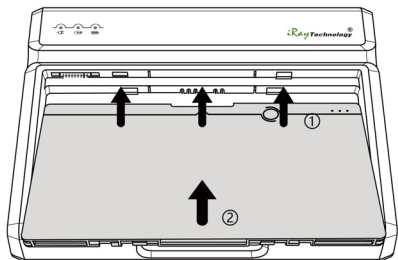
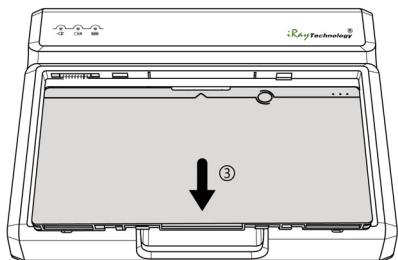
Mode Indicator	Lighting Status	Description
ON		Data transmission
OFF		Detector is off

Status indicator :

Mode Indicator	Lighting Status	Description
OFF		Detector is off
Green ON		Exposure is allowed

Orange ON		Error
-----------	---	-------

3.3. Battery Charger Installation

Operation	Figure
<ul style="list-style-type: none"> ● Unload Battery from battery charger. 	
<ul style="list-style-type: none"> ● Insert battery into battery charger. ● Note the interface position as figure. 	
<ul style="list-style-type: none"> ● Press the battery to the bottom of battery compartment. 	

4. Software Setup

4.1.	<i>System requirement</i>	39
4.2.	<i>Environment setup</i>	39
4.3.	<i>Wired Connection (for setting&maintenance)</i>	39
4.4.	<i>Software UI</i>	43
4.5.	<i>List of the HAZARDOUS SITUATIONS resulting from a failure of the IT-NETWORK</i>	64

4.1. System requirement

iDetector is developed and deployed on Windows Operation System, it can be run on Windows XP/Windows 7/Windows 8/Windows 10, OS should install latest service pack. And requires computer memory 4 GB minimum. The firewall should be shut down to avoid communication issue.

4.2. Environment setup

Setup files and download url are included in SDK directory: Tools\env_setup

1. Please install Microsoft .NET Framework 4.5(Windows XP only can install V4.0). Download from Microsoft web site, please.
2. Visual C++ redistributed package need to be installed: vcredist_x86_2013(or vcredist_x64_vs2013).
3. For Windows XP, full path should be used in file "bind.txt".

The wifi information should be configured for first use with wired connection. The configuration can be changed when needed.

4.3. Wired Connection (for setting&maintenance)



Figure 3-3-1

Connect the power cable and data cable to the detector as figure 3-3-1, please mind that there are two type-c interfaces on the detector, the one closes to the edge of the battery component is for data and command, the other one is for service.

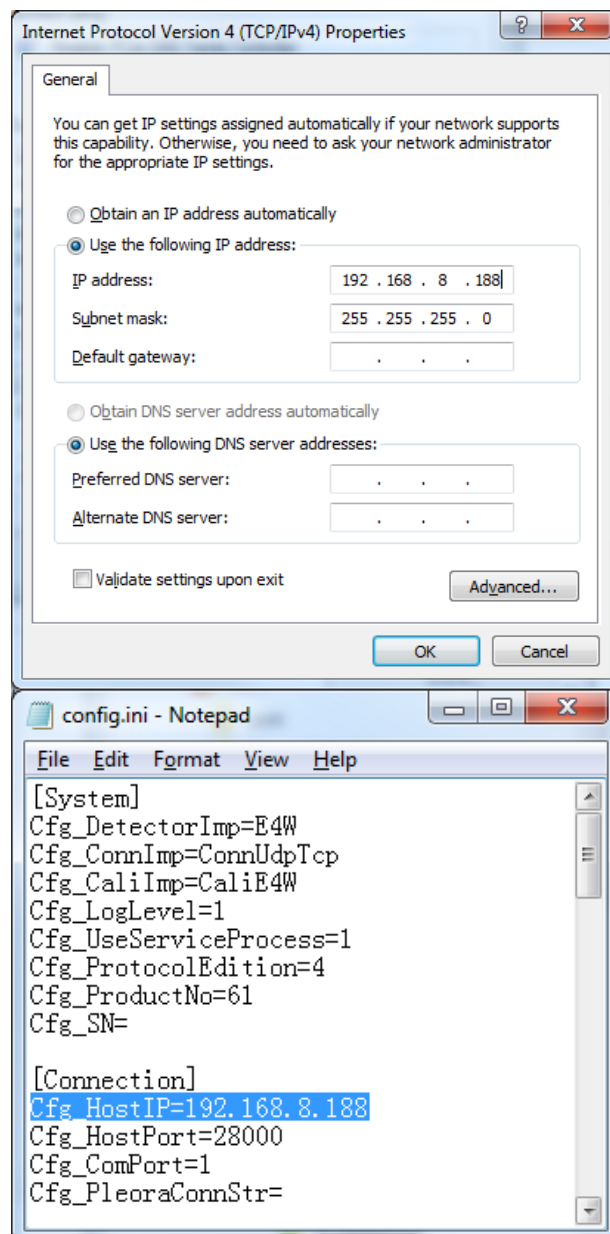


Figure 3-3-2

The default IP address (IPv4) of the detector is 192.168.8.8, the PC address (IPv4) should be configured as 192.168.8.xxx, which should be the same as the value of parameter “Cfg_HostIP” in file “*\work_dir\Mars1417X\config.ini”

Wireless Configuration

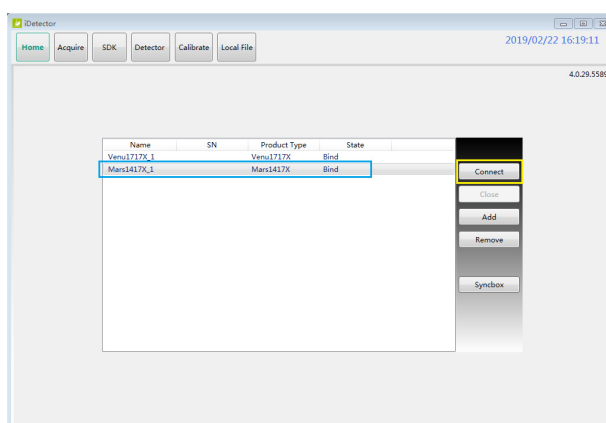


Figure 3-3-3

On the main window of Home page , select the instance of “Mars1417X” and use the “Connect” button to build the connection.

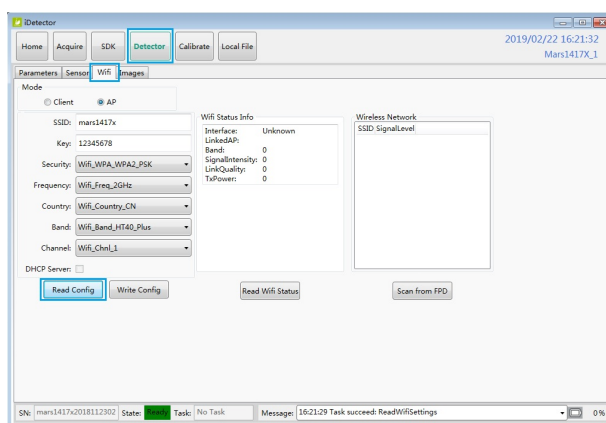


Figure 3-3-4

After finishing building the connection, click “Read Config” button on the “Wifi” tab of “Detector” pag to get the current wifi configuration.

User can set the mode of the wifi for detector, “AP” or “Client”.

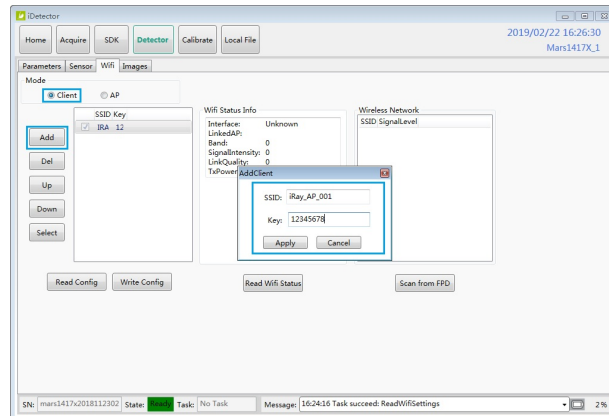


Figure 3-3-5

For Client mode, user can add the information of the access point with button “Add”, and set the default access point that the detector should connects to with button “Select”.

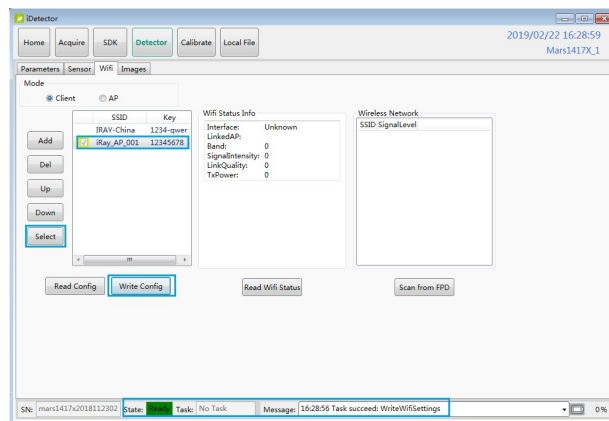


Figure 3-3-6

After click “Write Config” button, the new setting of the wifi will be valid after the status shows succeed.

The detector will connect to the access point when the data cable is removed.

What needs to be noticed is, the wifi frequency set on the “AP” interface will also be valid for “Client” mode.

4.4. Software UI

SDK supply iDetector as tool software:

32-bits iDetector.exe: Tools\iDetector\w32

64-bits iDetector.exe: Tools\iDetector\x64

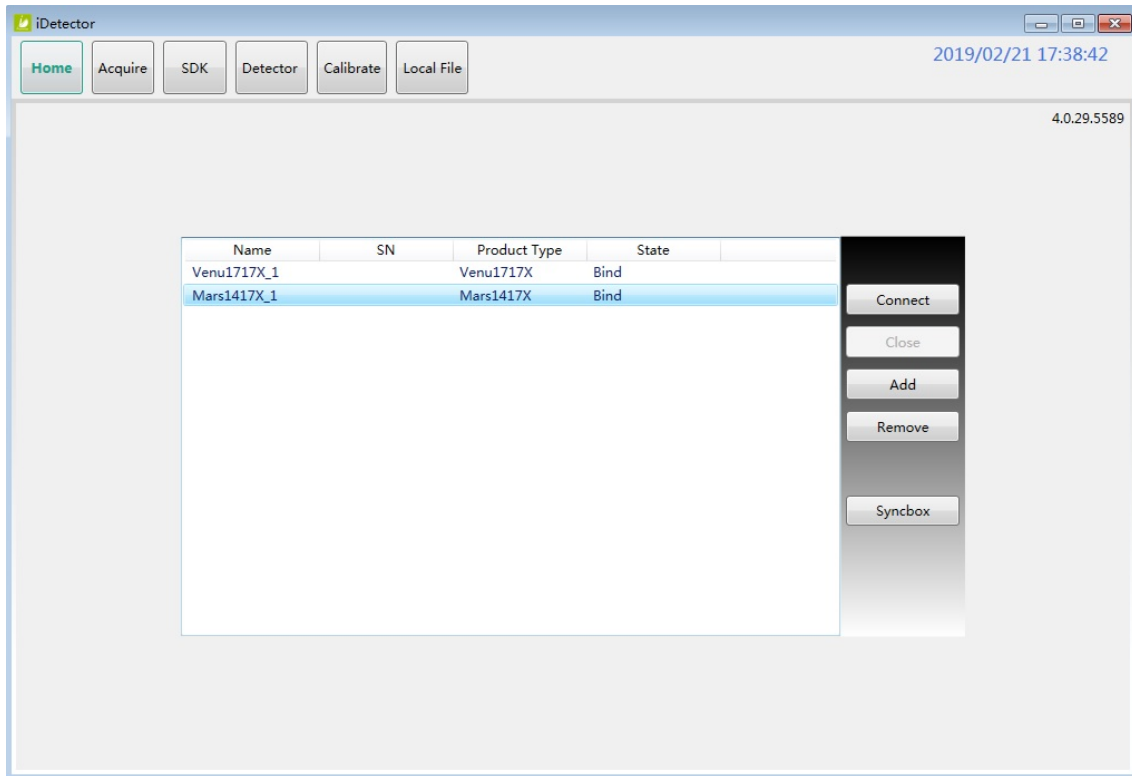
Double click iDetector.exe to run the software. For different software version, the UI maybe has little difference.

For this manual, the example is based on SDK_*_xxxx. This UI is almost the same for different versions of iDetector.

Tab	Function description
Home	Connect FPD and view the connect state
Acquire	Acquire image, select correction mode, save image and process image
SDK	config.ini setting, log level setting
Detector	Configurate parameters for detector.
Calibrate	Generate calibration files and manage the calibration files
Local File	Open and view local images.

4.4.1. HomePage

The main function in this page is to connect detector.

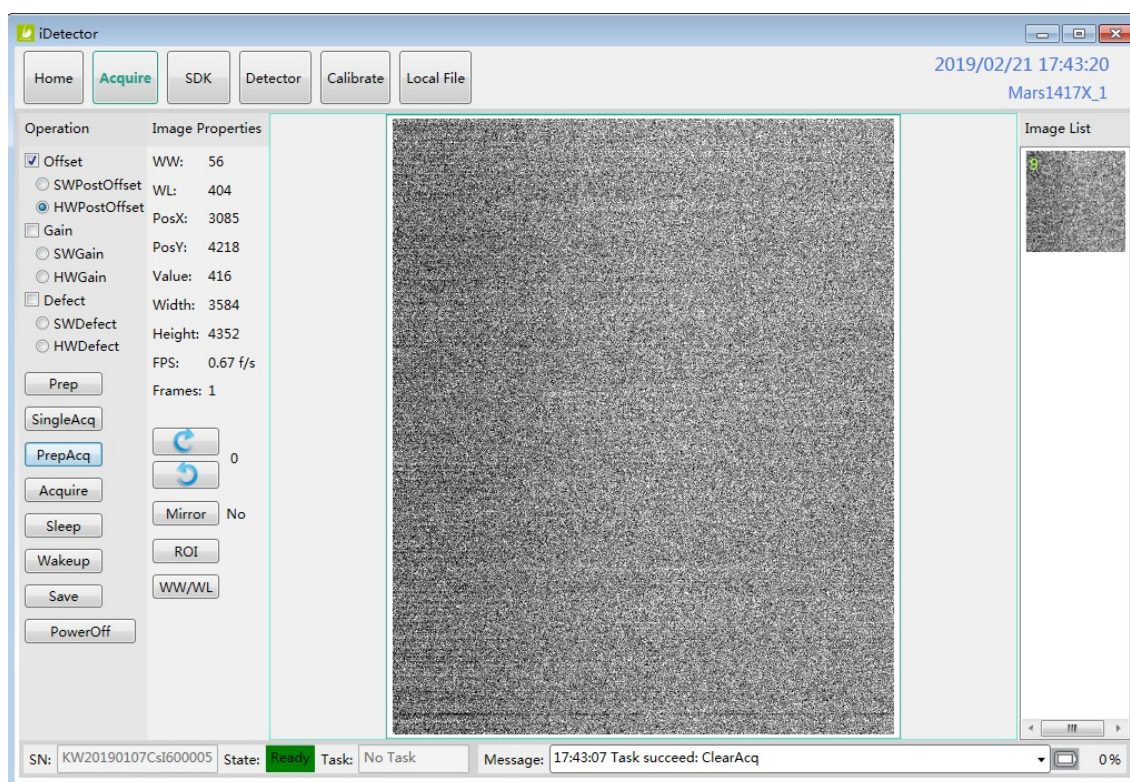


Item	Function description
Name	Display the name of detector
SN	Display the SN of detector
Product Type	Display the type of detector
State	Display the connection state (Bind , Unknown, Ready etc.)

Button	Function description
Connect	Click this button to connect the selected detector.
Close	Click this button to disconnect the selected detector.
Add	Add work directory
Remove	Remove work directory
Syncbox	Open Syncbox configuration window(Optional device)

4.4.2. Acquire Page

This page is used to acquire image under different work mode, and user can select correction options too. When acquire image finished there will be a preview image shown on the screen (if the correction option is selected, otherwise only the raw images will be shown). The properties of image is displayed on the left of image window. And on the right of image window there is a list to show thumbnail of images. User can select it and double click to see for detail. User can rotate, reverse or mirror image. User can get the value of AVG and SNR by ROI tool. The acquired images can be save as raw, tiff or dicom formats. Both raw and tiff formats support single frame and continuous frames save.





Status bar shows detector's serial number, the current task and state of detector, and feedback information of command. Status bar is also can be seen in other pages, and they are all the same.

Item	Description
SN	SN number of current connected detectors
State	Detectors state , eg busy, ready
Task	the current task of detector
Message	feedback information of command, eg succeed, failed

Functions in this Page.

Correction Menu		Description
Offset	HWPPostOffset	Do hardware PostOffset correction for image if checked
Gain	HWGain	Do hardware Gain correction for image if selected
Defect	HWDDefect	Do hardware defect correction for image if checked
Acquire Button		Description
Prep		Clear. Prepare to integrate.
SingleAcq		Acquire once
PrepAcq		Clear and acquire
Acquire		Acquire once
Sleep		Make the detector enter sleep mode (not supported for samples)
Save		Save the current image, the format is raw and tiff
PowerOff		Turn off the detector via command
Image Properties& Image Process		Description
WW		window width
WL		window level
PosX		X coordinates of the current cursor at the point

PosY	Y coordinates of the current cursor at the point
Value	Value of the current cursor at the point
Width	Image width
Height	Image height
FPS	Frame rate
Frames	Display the frame count
	Rotate the image clockwise, 90 degrees every time.
	Rotate the image anticlockwise, 90 degrees every time.
Mirror	Open or close mirror
ROI	ROI tool , to view the image of the AVG, SV, SNR and other parameters with right click. Press "ctrl" key, can create several ROI area.
WW/WL	Auto adjust WW/WL based on selected area by right button of mouse.
Image List	Show thumbnails

When the image is displayed on the screen, maybe the user want to see details by dragging or zoom in/out the image, for convenience, these are some shortcuts.

1. Click the left mouse button: movie playback function operation area display.
2. Double-click the left mouse button: the image display in center and with maximum size;
3. Double-click the right mouse button: restore the window level and width for
WL:32767/WW:65535;
4. Drag the left mouse button to drag the image display;
5. Lateral-drag the right mouse button to adjust the window width, and vertical-drag the right mouse button to adjust the window level;

6. F3 Key: Quickly locate the image window width and window level.
7. F4 Key: Adjust window width and window level automatically.

4.4.3. SDK Pgae

SDK page is used to set parameters in config.ini and log level.

The screenshot shows the 'iDetector' application window with the 'SDK' tab selected. The interface includes a top menu bar with tabs: Home, Acquire, Factory, SDK, Detector, Calibrate, and Local File. The main area is divided into two columns of configuration fields. The left column contains fields for WorkDir Protocol Edition (4), WorkDir ProdNo (42), WorkDir SN (IIX660000T1225190003), Detector DLL (E45W), Connection DLL (ConnUdpTcpE51), Calibration DLL (CaliE4W), Log Level (LogLevel_Debug), Use Service Process (On), Host IP (192.168.8.188), Host Port (28000), Remote IP (192.168.8.8), Remote Port (27888), COM Port (1), Pleora Connect String, Pleora Packet Size (0), Winpcap Connect String, Pleora Max FPS (60), and Image Port (0). The right column contains corresponding input fields and 'Set' buttons for several of these parameters. On the far right, there is a 'SetLogLevel' section with a dropdown menu set to 'LogLevel_Debug' and a 'Set' button. The bottom status bar displays 'SN: IIX660000T1225190003', 'State: ready', 'Task: No Task', and a message: '1/:15:56 Task succeed: Connect'. A progress indicator shows '0%'.

Different log level will show different details. It is recommended to set the log level as Debug

4.4.4. Detector Page

In this page, there are Parameters, Sensor and Images tab.

- **Parameters**

1. Enter Detector page, the tab of Paramters is activity by default. There are 5 regions in this page.
2. Parameter name region: lists the paramters.