Mars1417VS

Wireless Digital Flat Panel Detector

User Manual

2021. 12. 02

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Contents

Mars1417VS

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Service Office

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

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ZIP CODE : 201201
TEL : +86-21-50720560 FAX : +86-21-50720561
HOMEPAGE : WWW.IRAYGROUP.COM

In the event of product failure that cannot be removed, please contact after-sale service office of iRay or product dealer, and provide the following information as per the product nameplate: ① **Name and model of product;** ② **Serial number of product**; Description of product failure as detailed as possible.

Thank you for choosing the **Mars1417VS Wireless Digital Flat Panel Detector** (hereinafter referred to as "**Mars1417VS**") from iRay Technology Co. Ltd. (hereinafter referred to as "iRay").

Manufacturer Information

COMPANY :   iRay Technology Co.LTD.
ADDRESS : RM202, Building 7, NO. 590, Ruiqing RD., Zhangjiang East, Pudong, 201201Shanghai, P.R. China
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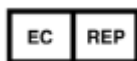TELEPHONE : +86-21-50720560
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Trademarks

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Disclaimer

1. 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.

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.

Product Life

⧖	The estimated product lifetime is up to 7 years under appropriate regular inspection and maintenance.
⚠	The product life cycle is decided by the life cycle of the detector. For other replaceable parts, their service life will not affect the life cycle of the whole product.

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.

Environmental Protection

This symbol indicates that this product cannot be disposed as domestic or commercial waste.

Recycling Your iRay Equipment

Please do not dispose of this product as domestic or commercial waste. Improper handling of this type of waste may result in a negative impact on health and environment. Some countries or regions, such as the European Union, set up systems to collect and recycle electrical or electronic waste items. Please contact your local authorities for information. If no instructions are available, call iRay Customer Service for assistance.

Notes on usage and management of the equipment

1. Read all 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.

Safety Information

This manual contains information about **Mars1417VS.** Before operating the device, read the user manual carefully and pay attention to all safety information. Please use it correctly on the basis of full understanding of the content, so as to avoid adverse events caused by improper operation, including but not limited to patients receiving excessive radiation. All information in this manual, including illustrations, is based on device prototypes. If your device does not contain these contents, they will not apply to your device.

Please take good care of this user manual for future reference.

Safety Symbols and Conventions
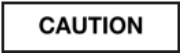
The following symbols and conventions are used in the whole user's manual.

⚠ WARNING	This symbol is used to identify that the product may cause death or serious personal injury if not use properly.
⚠ CAUTION	This symbol is used to identify that product may cause minor personal injury if not use properly.

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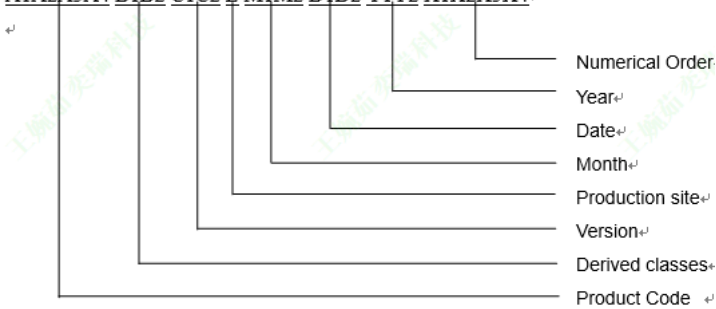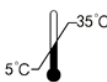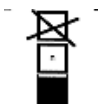|	
CAUTION	This symbol is used to identify the product may cause property damage if not use properly.
⊘ Prohibited	This symbol is used to indicate a prohibited operation.
❗	This symbol is used to indicate an action that must be performed.
◈ Important	This symbol is used to indicate important operations and restrictions. Please be sure to read this information to prevent property damage and failure.
ⓘ Information	This symbol is used to provide reference and complementary information for operations. Users are suggested to read this information.

Labels and Markings

The labels and markings on the equipment of our company are explained as follows:

Symbol	Explanation
SN	This symbol is used to identify the manufacture series number which is after, below or adjacent to the symbol. The series number of our products is usually made of nineteen digits as shown below: A1A2A3A4 B1B2 C1C2 L M1M2 D1D2 Y1Y2 X1X2X3X4 Numerical Order Year Date Month Production site Version Derived classes Product Code

Symbol	Explanation	Symbol	Explanation
🏭	This symbol is used to indicate the name and address of manufacturer. The date of manufacture is combined on the symbol	⚠	This symbol is used to indicate "Caution: please refer to relevant documents."
EC REP	This symbol is used to indicate the name and address of authorized iRay representative in the region of European Union.	CE	This symbol is used to indicate that the equipment has passed the CE certification and the number next to this symbol refers to the code of certification body.

Symbol	Explanation	Symbol	Explanation
	This symbol is used to indicate consultation of user manual for instructions.		This symbol is shown on main machine of the detector and indicates the operating temperature limits.
	This symbol is used to indicate "Safety sign: please see safety instructions"		This symbol is shown on the package and indicates that it should be kept dry.
	This symbol is used to indicate "Safety sign": Danger Voltage.		This symbol is shown on the package and indicates that the equipment should be kept up right.
	This symbol is used to represent non-ionizing electromagnetic radiation		This symbol is shown on the package and indicates that the packaging box should not be rolled over.
	This symbol is shown on the package and indicates that it is fragile.		This symbol is shown on the package and indicates the maximum number of stacking layers (ten layers at most).
	This symbol is shown on the package and indicates that it should be kept away from direct sunlight.		This symbol indicates that it should be handled with care.
	This symbol is shown on the package and indicates that it is Type-B applied part.	**IP**$_{\times 3}$	This symbol is shown on the package and indicates that it is IP×3.

Safety Precautions

◆ **Warning**

Follow the following safety precautions and use the equipment properly to prevent personal injury and equipment damage

Installation & Operation Enviroment	**Do not use or store the equipment near flammable chemicals such as alcohol, thinner, benzene, etc.**
	If chemicals are spilled or evaporated onto the equipment, it may contact with electric parts inside the equipment and cause fire or electric shock. Also, some disinfectants are flammable. Be sure to take care when using them.
	Do not connect the equipment with any devices other than those specified.
	Otherwise, it may result in fire or electric shock.
	All the patients with active implantable medical devices should be kept away from the equipment.

Regulations & Safety

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| ◆ | **Warning** |

Follow the following safety precautions and use the equipment properly to prevent personal injury and equipment damage

Power Supply	**Do not supply power to the equipment with power source other than that specified in the nameplate.**
	Otherwise, it may result in fire or electric shock.
	Do not handle the equipment with wet hands.
	Otherwise, it may result in electric shock that could result in death or serious injury.
	Do not place heavy objects such as medical equipment on cables and cords. Do not pull, bend, bundle, or step on cables to prevent their sheath from being damaged, **and do not alter them neither.**
	Otherwise, it may damage the cables which could result in fire or electric shock.
	Do not use a same AC outlet to supply power to more than one piece of equipment.
	Otherwise, it may result in fire or electric shock.
	Do not turn ON the system power when condensation has formed on the equipment.
	Otherwise, it may result in fire or electric shock.
	Do not connect a portable socket-outlet or extension cord with multiple interfaces to the equipment.
	Otherwise, it may result in fire or electric shock.
	To avoid the risk of electric shock, this equipment must be connected to the power supply with protective earth.
	Otherwise, it may result in fire or electric shock.
	Maintain good contact between the power cord and the AC power outlet. If contact failure occurs, or metal objects contact with the plug, fire or electric shock may be caused.
	Be sure to turn OFF the power before connecting or disconnecting the cables between equipment. Otherwise, it may result in electric shock that could result in death or serious injury.
	Be sure to hold the plug or connector firmly when disconnecting the cable. If you pull the cable with force, the core wire may be damaged, resulting in fire or electric shock.

◆ **Warning**

Follow the following safety precautions and use the equipment properly to prevent personal injury and equipment damage

Operation Precautions ⊘	**Do not disassemble or modify the equipment. No modification to this equipment is allowed. Parts of the Mars1417VS that are not serviced or maintained while in use with the patient.** Otherwise, it may result in fire or electric shock. Also, touching the integrated parts may cause electric shock, which may cause death or serious injury. **Do not place anything on top of the equipment.** The objects may drop and be damaged. In addition, if any metal items such as needle or clamp, or liquid drop into the equipment, it may cause fire or electric shock. **Do not hit or drop the equipment.** The equipment may be damaged if it is jolted strongly, which may result in fire or electric shock if the equipment is used without being repaired. **Do not put the equipment together with the pointed objects.** Doing so may damage the equipment; in general, the equipment should be used in bucky.
Failure Handling ❗	**In case of any one of the following conditions, immediately turn OFF the power supply, unplug the power cord from the AC outlet, and contact your sales representative or local iRay dealer:** - When there is smoke, an odd smell or abnormal sound. - When liquid is spilled into the equipment or a metal object enters into the equipment through an opening. - When the equipment drops and is damaged.
Maintenance & inspection ❗	**Please turn OFF the power of the equipment and unplug the power cord from the AC outlet before cleaning.** NEVER use alcohol, ether and other flammable cleaning agent to clean the equipment for the sake of safety. NEVER use methanol, benzene, acid, alkali or other corrosive liquids to clean the equipment. **Do not immerse the equipment in liquid.** **Please make sure that the equipment's surface & plugs are dry before turning ON the power.** Otherwise, it may result in fire or electric shock.
❗	**Unplug the plug from the AC outlet periodically for cleaning the plug and clean the AC outlet and its periphery with a dry cloth.** If the power cord is kept plugged in for a long time in a dusty, dark and humid environment, dust around the plug will absorb moisture and 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 routine inspections indicated in this manual.** Otherwise, it may result in electric shock.

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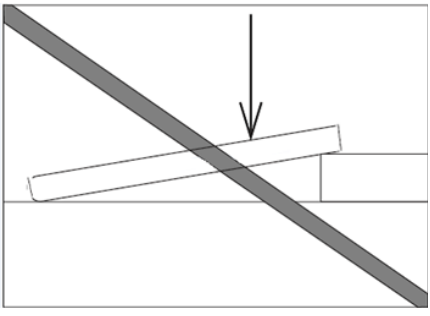
	◆ **Cautions**

Follow the following safety precautions and use the equipment properly to prevent personal injury and equipment damage

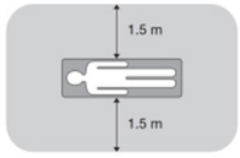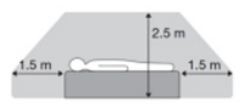| Installation & Operation Enviroment	**Do not install and use the equipment in the following conditions. Otherwise, it may result in equipment failure, fire or personal injury.** ● Facilities near water source ● Under the direct sunlight ● Near air-conditioning or ventilation equipment ● Near heat sources, such as heater ● Unstable power supply ● In the dusty environment ● In saline or acid environment ● In the environment with high temperature and humidity ● In freezing or condensing environment ● In the environment prone to vibration ● In slope or unstable area **Make sure the cables will not twist during use. Furthermore, do not make your feet be wound by the cable.** Otherwise, it may result in equipment failure or personal injury.
Power Supply	**Always connect the three-core power cord plug to a properly grounded power outlet.** **For easy access to power cord plug, avoid placing any obstacle near the outlet. Otherwise, it may not be possible to turn off the power immediately in case of an emergency.** **Be sure to ground the equipment to an indoor grounded connector. Also, be sure to connect all the devices to a common ground.** **Do not use any power source other than the one provided with this equipment.** Otherwise, it may result in fire or electric shock.
CAUTION	**Do not spill the liquid or chemicals onto the equipment. Do not allow the equipment to contact with blood or other body fluids of the patient.** Otherwise, it may result in fire or electric shock. **For avoiding such contact, the disposable protective covers should be used to protect the equipment.** **Turn OFF the power when the equipment is not used for the sake of safety.**

Follow the following safety precautions and use the equipment properly to prevent personal injury and equipment damage

Operation Precautions	
🚫	**Handle the equipment carefully.** **Do not immerse the equipment in water.** **If the equipment is subject to strike or dropping, the internal image sensor may be damaged.** **Do not place heavy objects on the equipment.** Otherwise, the internal sensor may be damaged and the equipment may not work normally to collect images. **<Load Limit>** Uniform load：150 kg over the whole area of the detector surface. Local load：100 kg on an area 4 cm diameter. 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. Otherwise, the image will be incorrect.
❗	Do not close to fire, do not use in high temperature Do not invert positive and negative pole Do not contact with metal in case of short circuit Do not insert sharp objects into battery Do not beat battery Do not stand on battery Do not use battery out of rules Do not dispose battery or change internal structure Do not submerge battery in water, please keep dry in storage and do not contact with water in use Please charge battery with charger following IEC60601-1 & IEC62133 Standards provide by us Do not mix battery with ones not provided by our company Do not charge battery with broken charger.

Regulations & Safety

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Notes for Using the Equipment

Pay attention to the following precautions when using the equipment. Otherwise, the equipment may not function correctly.

Before exposure

Be sure to check the equipment daily and confirm that it works properly.

When room is heated up suddenly in cold areas, it will cause condensation on the equipment. In this case, wait until the condensation evaporates before performing an exposure. If condensation occurs during the use of the equipment, the images captured may suffer from quality problems. When an air-conditioner is used, be sure to raise/decrease temperature gradually to ensure that the temperature difference between room and equipment will not cause condensation.

The detector should be warmed up for 15 minutes before exposure or creation of correction template.

Be sure there be a battery installing on the Mars1417VS to avoid the power off suddenly.

During exposure

Do not move the power during exposure. Otherwise, it may cause image noise, artifacts or incorrect images.

Do not use the equipment in areas with strong magnetic field. Otherwise, it may cause image noise, artifacts or incorrect images.

After exposure

Turn off the power to the detector when the flat panel detector is not used.

Notes for Using of Battery

• Battery is shipped with detector; remaining capacity should be charged greater than or equal to 50% but less than 60%. If storage without use, charge greater than or equal to 50% but less than 60% every 3 months, or it causes damage to battery.

• Battery is shipped in package without detector, remaining capacity should be charged greater than or equal to 20% but less than 30%, If storage without use, charge greater than or equal to 20% but less than 30% every 2 months, or it causes damage to battery. If battery remaining capacity is lower than 20%, delivery is not allowed, or it is possible to be over discharge.

• Battery storage and working environment should strictly follow specification. If there is any objection, there is possibility to damage performance

• If battery is not used in detector, please detach it.

Disinfection and Cleaning

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

Main Safety Features of Product

◆ Medical Equipment Classification	
Classified by type of protection against electrical shock	Equipment (medical approved adaptor) Internal electrical power source equipment (battery)
Classified by degree of protection against electrical shock	Type B Application Part
Classified by degree of protection against ingress of water	IPX3
Classified by 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

◆ Safety standards reference	
MDD (93/42/EEC)	Medical Device Directive
Directive 2011/65/EU	Restriction of the use of certain hazardous substances (RoHS)
EN ISO 13485:2016	Medical devices– Quality management systems– Requirements for regulatory purposes
EN ISO14971: 2012	Medical device – Application of risk management to medical devices
IEC 60601 1: 2005 + CORR. 1 (2006) + CORR. 2 (2007) + AM1 (2012)	Medical electrical equipment –Part 1: General requirements for basic safety and essential performance
EN 60601-1:2006+A11:2011+A1:2013+A12:2014	Medical electrical equipment – Part 1: General requirements for basic safety and essential performance

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BS EN 60601-1:2006+A11:2011	Medical electrical equipment –Part 1: General requirements for basic safety and essential performance
ANSI/AAMI ES60601-1:2005/ (R)2012+A1:2012+C1:2009/(R)2012+A2:2010/ (R)2012	Medical electrical equipment – Part 1: General requirements for basic safety and essential performance
CAN/CSA-C22.2 No.60601-1:14	Medical electrical equipment –Part 1: General requirements for basic safety and essential performance
IEC 60601-2-54:2009+A1:2015	Medical electrical equipment –Part 2-54: Requirements for the basic safety and essential performance of X-ray equipment for radiography and radioscopy
CAN/CSA-C22.2 NO. 60601-2-54:11	Medical electrical equipment –Part 2-54: Requirements for the basic safety and essential performance of X-ray equipment for radiography and radioscopy
IEC 60601-1-6:2010+A1:2013	Medical electrical equipment Part 1-6: General requirements for basic safety and essential performance — Collateral standard: Usability
CAN/CSA-C22.2 NO. 60601-1-6:11+A1:2015	Medical electrical equipment Part 1-6: General requirements for basic safety and essential performance — Collateral standard: Usability
EN 60601-1-6:2010+A1:2015	Medical electrical equipment Part 1-6: General requirements for basic safety and essential performance — Collateral standard: Usability
EN 60601-1-2:2015	Medical electrical equipment – Part 1-2: General requirements for basic safety and essential performance– Collateral standard: Electromagnetic disturbances– Requirements and tests
IEC 62133-2:2017	Secondary cells and batteries containing alkaline or other non-acid electrolytes-safety requirements for portable sealed secondary lithium cells, and for batteries made from them, for use in portable applications-part 2: lithium systems.
EN 62220-1-1:2015	Medical electrical equipment – Characteristics of digital X-ray imaging devices–Part 1-1: Determination of the detective quantum efficiency
EN 62304:2006/AC:2008	Medical device software – Software life-cycle processes
EN 62366:2008	Medical devices – Application of usability engineering to medical devices
ISO 15223-1:2016	Medical devices-symbols to be used with medical device labels, labeling and information to be supplied–Part1: General requirements

Radio Frequency (RF) Energy

• This device is designed and manufactured not to exceed the emission limits for exposure to radio frequency (RF) energy set by the Federal Communications Commission of theUnited States.

• During SAR testing, this device was set to transmit at its highest certified power level in all tested frequency bands, and placed in positions that simulate RF exposure in usage against the body with no separation. Although the SAR is determined at the highest certified power level, the actual SAR level of the device while operating can be well below the maximum value.

• This is because the device is designed to operate at multiple power levels so as to use only the power required to reach the network. In general, the closer you are to a wireless base station antenna, the lower the power output.

• The exposure standard for wireless devices employing a unit of measurement is known as the Specific Absorption Rate, or SAR. The SAR limit recommended by the ICNIRP used by the general public is 2.0W/kg averaged over ten grams of tissue and, is 1,6W/kg averaged over one gram of tissue by IEEE Std 1528.

• The FCC has granted an Equipment Authorization for this product with all reported SAR Levels evaluated as in compliance with the FCC RF exposure guidelines.

• For this device, the highest FCC reported SAR value for usage is 0.106W/kg.

• While there may be differences between the SAR levels of various product and at various positions, they all meet the government requirements.

• SAR compliance for body-worn operation is based on a separation distance of 0 mm between the unit and the human body. Carry this device at least 0 mm away from your body to ensure RF exposure level compliant or lower to the reported level. To support body-worn operation, choose the belt clips or holsters, which do not contain metallic components, to maintain a separation of 0 mm between this device and your body.

• RF exposure compliance with any body-worn accessory, which contains metal, was not tested and certified, and using such body-worn accessory should be avoided.

Guidance and manufacture's declaration for EMC

◆ EMI Compliance Table		

Emissions

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

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◆ EMS Compliance Table		
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
Radiated RF EM field	IEC 61000-4-3	3V/m 80MHz-2.7GHz 80% AM at 1kHz
Near fields from RF wireless communications equipment	IEC 61000-4-3	Refer to table "Near fields from RF wireless communications equipment"
Rated power frequency magnetic fields	IEC 61000-4-8	30A/m 50Hz or 60Hz

◆ Near 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 ac 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

◆ Input ac power port		
Voltage dips	IEC 61000-4-11	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

Note:Portable RF communications equipment, including antennas, can affect medical electrical equipment. The warning should include a use distance such as "be used no closer than 30 cm (12 inches) to any part of the [ME EQUIPMENT or ME SYSTEM], including cables specified by the manufacturer".

Reference Information on Cables Provided by EMC

Mars1417VS wireless digital flat panel detector should take particular preventive measures against EMC.

The detector should be put into use by the personnel of our company or authorized by our company according to EMC information indicated in user's manual.

Mars1417VS wireless digital flat panel detector may sense electromagnetic interference from portable and mobile RF communication equipment in use, such as mobile (cellular) phone. The electromagnetic interference may cause incorrect operation of the system, resulting in potential unsafe condition.

Mars1417VS 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 Mars1417VS as replacement parts for inner components, may result in increased emission or decreased immunity.

Radio Frequency Compliance Information

Country	Item
U.S.A	KDB 865664 D01 47 CFR part 15, subpart B 47 CFR part 15, subpart C 15.247 47 CFR part 15, subpart C 15.407 47 CFR §2.1091 KDB447498 D01 General Exposure Guidance v06

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European Union	EN 301 489-1 V 2.1.1
	EN 301 489-17 V 3.1.1
	EN 300 440 V 2.1.1
	EN 300 328 V 2.1.1;
	EN 301 893 V 2.1.1
	EN 62311:2008
	EN 62209-2:2010
	EN 50566:2017
	EN 62476:2010
	EN 55032:2015
	EN 61000-3-2:2014
	EN 61000-3-3:2013

FCC Compliance

- This equipment has been tested and found to comply with the 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 tow conditions:
  This device may not cause harmful interference.
  This device must accept any interference received, including interference that may cause undesired operation.
- This equipment generates, uses, and can radiate 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 this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measure.
- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the distributor or an experienced radio/TV technician for help.

SAR Compliance

This equipment complies with FCC exposure limits set forth for an uncontrolled environment.

Battery Safety Standards

Standards	Description
IEC 62133-2:2017	Secondary cells and batteries containing alkaline or other non-acid electrolytes-safety requirements for portable sealed secondary lithium cells, and for batteries made from them, for use in portable applications-part 2: lithium systems.
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

General Introduction

Product Name	Product Model
Wireless Digital Flat Panel Detector	Mars1417VS

Intended Use

Mars1417VS 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.

Applicable Scope

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.

Basic Features

Mars1417VS is a cassette-size wireless X-ray flat panel detector based on amorphous silicon thin-film transistor technologies. It is developed to provide the good quality of radiographic image, which contains an active matrix of 2304×2800 with 150um pixel pitch. Panels' scintillator is CsI (Cesium Iodide). Mars1417VS supports wireless communication between panel and Workstation, and can be used as a real portable panel.

According to the Mars1417VS series 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"

Packing List

Mars1417VS comes with battery package. Once powered on, it would build a connection with Workstation through Ethernet cable (only for service) or Wireless connection.

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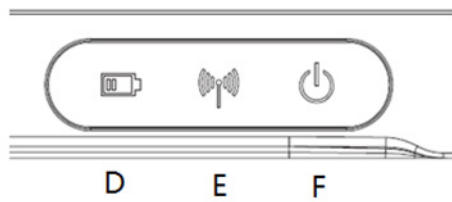| Name	Figure	Quantity
Detector		1pc Main Unit
Battery		1pc Battery pack
Ethernet Cable (Only for service)		1pc 1 m
Ethernet Adapter		1pc
Battery Charger (optional)		1pc

Product Composition

Detector

Interface

No.	Item	Description
D	Power	Power button of control panel
E	Link	Link button of control panel
F	Status	Status button of control panel

LED indicator

Items	Color	Descriptions
Power	Green	Battery capacity is 11%~100%
	Orange	Battery capacity is 6%~10%
	Orange (blinking)	Battery capacity is 0%~5%
	Green (blinking)	The battery is charging

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	Green	WIFI connecting is normal
Link	Orange	WIFI link is lost
Status	Green	SDK is OK
	Orange	SDK is disconnect or firmware update
	Green (blinking)	Exposure indication
	Orange (blinking)	FPD Error

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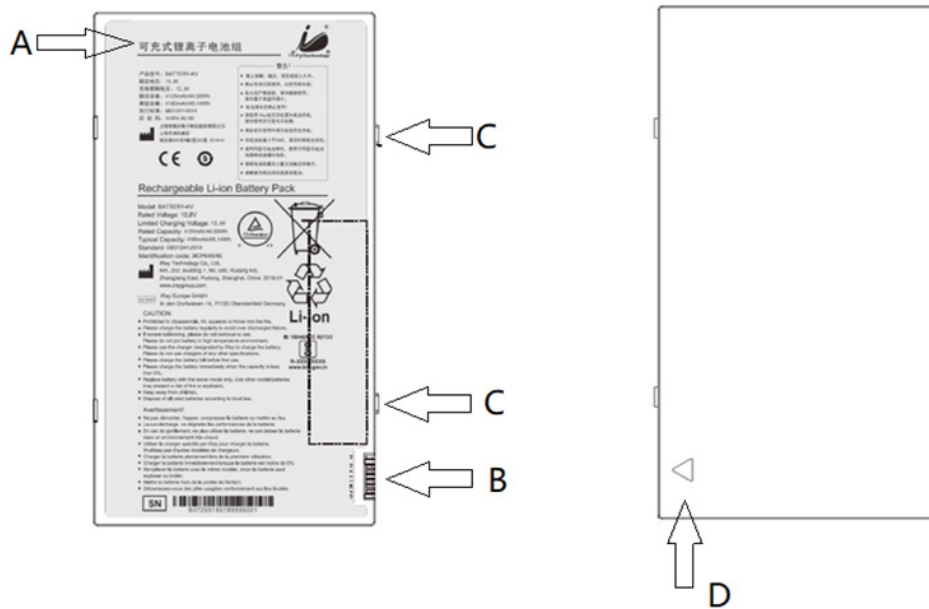
Item	Name	Description
A	Battery Label	/
B	Battery Interface	8 Pin Battery connector
C	Pilot Pin	/
D	Indicator	Installation direction indicator

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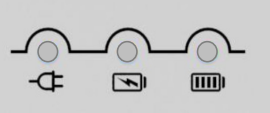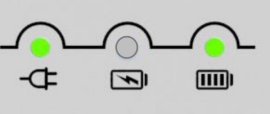
Item	Name	Description
A	Battery Interface	8 Pin Battery connector
B	Capacity Indicator	The indicator definition is as follow
C	Power Indicator	The indicator definition is as follow
D	Hand Pull Position	/
E	The limit ball plug	/
F	DC Jack	24V DC input

The battery charger indicator definition
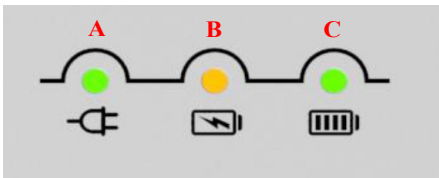
Item	Name	Description
A	Power Indicator	/
B	Charging Indicator	/
C	Charge Full Indicator	/

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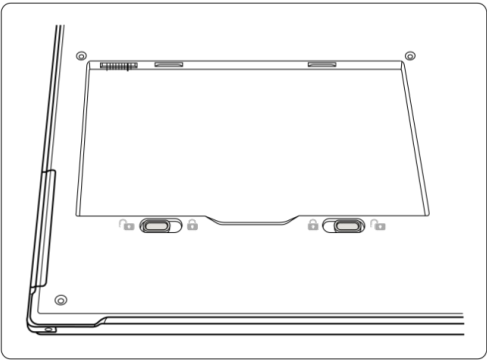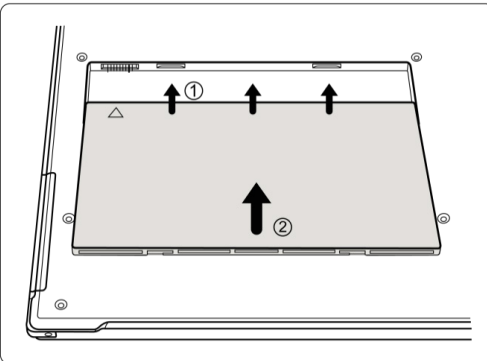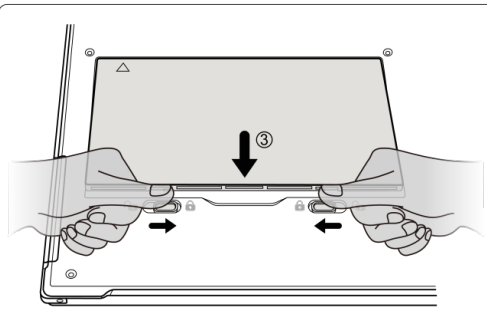
X Indicator	Lighting Status	Operating Status
All off		No power input
A indicator on		AC Power input Multiple batteries inserted
A indicator on B and C alternately blink 2 times		Battery insertion self-test
A and B indicator on		Battery Charging
A and C indicator on		Battery capacity full, charging stops
A indicator on B and C alternately blinking		Battery charging abnormal

Two or more battery charging at the same time is prohibited, if inserted at the same time, the charger will automatically stop working.
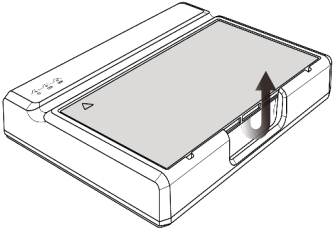
Product Installation
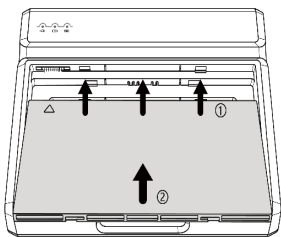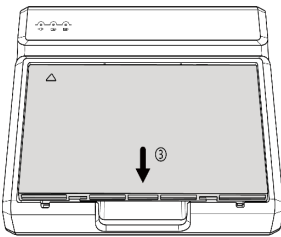
Panel Installation

Mars1417VS can be powered by battery package. Once battery package is inserted, panel would be activated immediately. If none of battery, Mars1417VS 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.	

Battery Charger Installation

Operation	Figure
Unload Battery from battery charger.	

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Insert battery into battery charger. Note the interface position as figure.	
Press the battery to the bottom of battery compartment.	

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
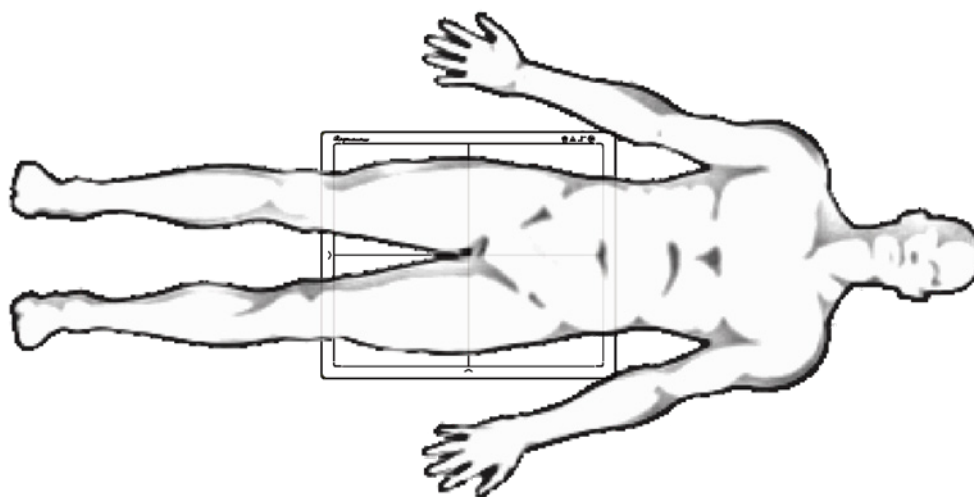
Trouble Shooting

(1) The operating system is not compatibility

(2) Change or upgrade 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

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Software Installation

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. Firewall should be shut down to avoid communication issue.

Environment setup

Setup files and download url are included in Software Development Kit (hereafter refers as 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".
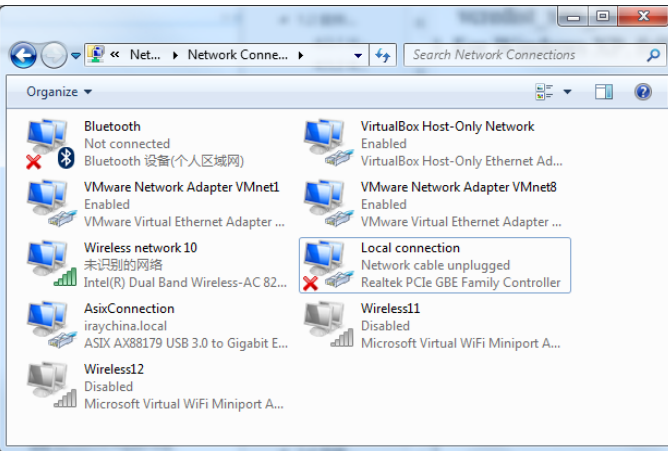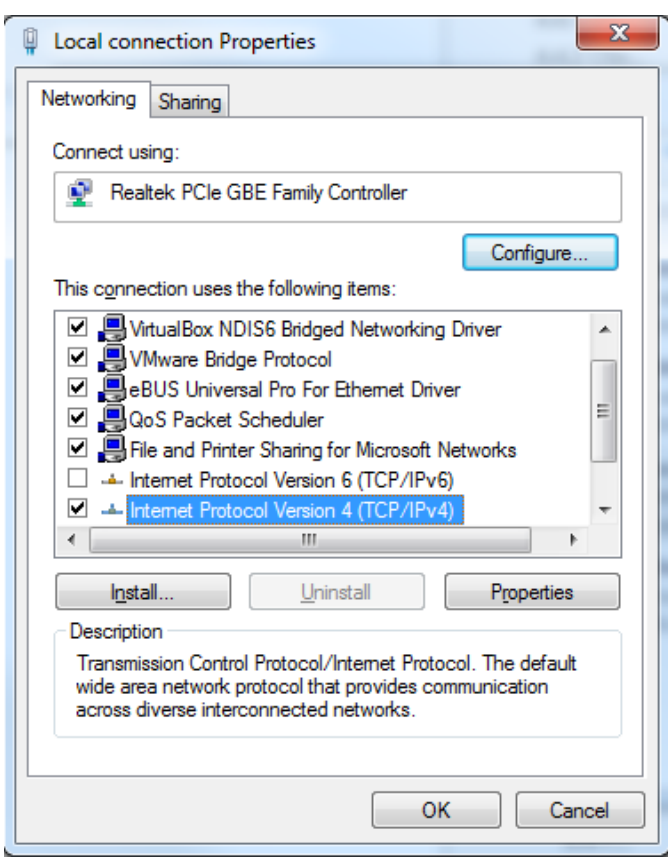
Connection Mode
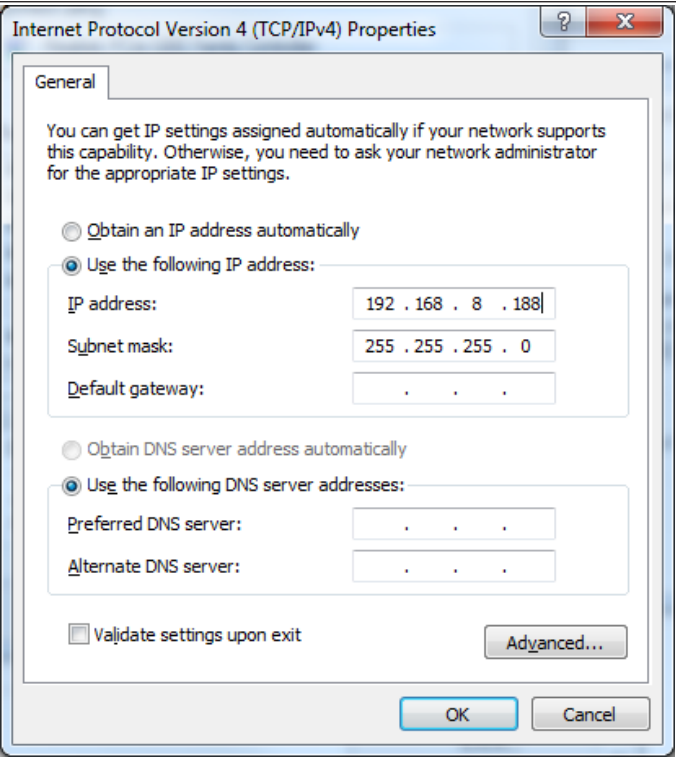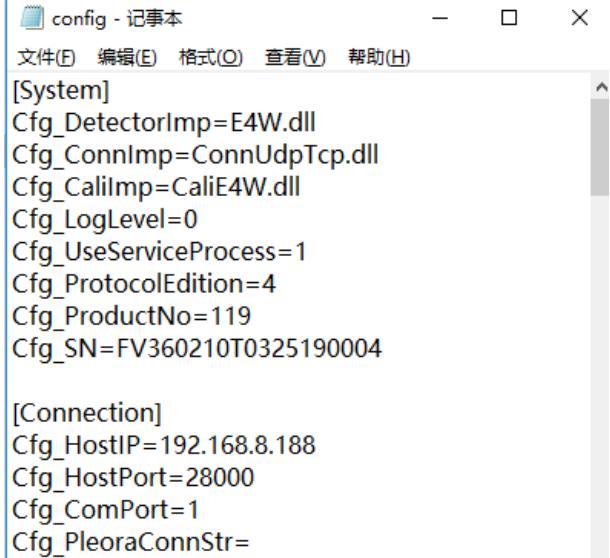
Mars1417VS supports one connection modes as follows, the IP address and other information mentioned below is as the example, user should configure the connection with the specific requirement.

Wireless Client Mode as below.
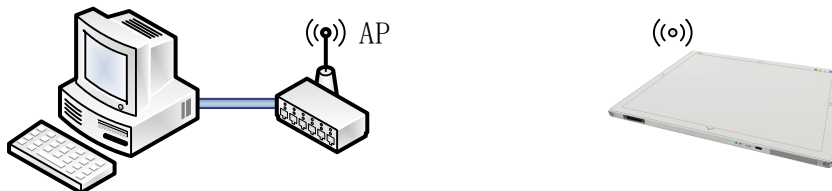
Wired Connection Setup (Service Only)

Select wired network adapter that connected to the detector.	
Right click the network adapter. Then select properties.	

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Double click IPV4 item Default IP settings: IP address：192.168.8.188 Subnet mask： 255.255.255.0	Internet Protocol Version 4 (TCP/IPv4) Properties General You can get IP settings assigned automatically if your network supports this capability. Otherwise, you need to ask your network administrator for the appropriate IP settings. ○ Obtain an IP address automatically ◉ Use the following IP address: IP address: 192 . 168 . 8 . 188 Subnet mask: 255 . 255 . 255 . 0 Default gateway: . . . ○ Obtain DNS server address automatically ◉ Use the following DNS server addresses: Preferred DNS server: . . . Alternate DNS server: . . . ☐ Validate settings upon exit Advanced... OK Cancel
The IP address should be identical with Cfg_HostIP item in work_dir\Mars1417VS \config.ini file.	config - 记事本 文件(F) 编辑(E) 格式(O) 查看(V) 帮助(H) [System] Cfg_DetectorImp=E4W.dll Cfg_ConnImp=ConnUdpTcp.dll Cfg_CaliImp=CaliE4W.dll Cfg_LogLevel=0 Cfg_UseServiceProcess=1 Cfg_ProtocolEdition=4 Cfg_ProductNo=119 Cfg_SN=FV360210T0325190004 [Connection] Cfg_HostIP=192.168.8.188 Cfg_HostPort=28000 Cfg_ComPort=1 Cfg_PleoraConnStr=

Client Mode Connection

To complete wireless connection configuration, user must finish actions listed below. The following is just an example and can be configured to fit the user's needs.

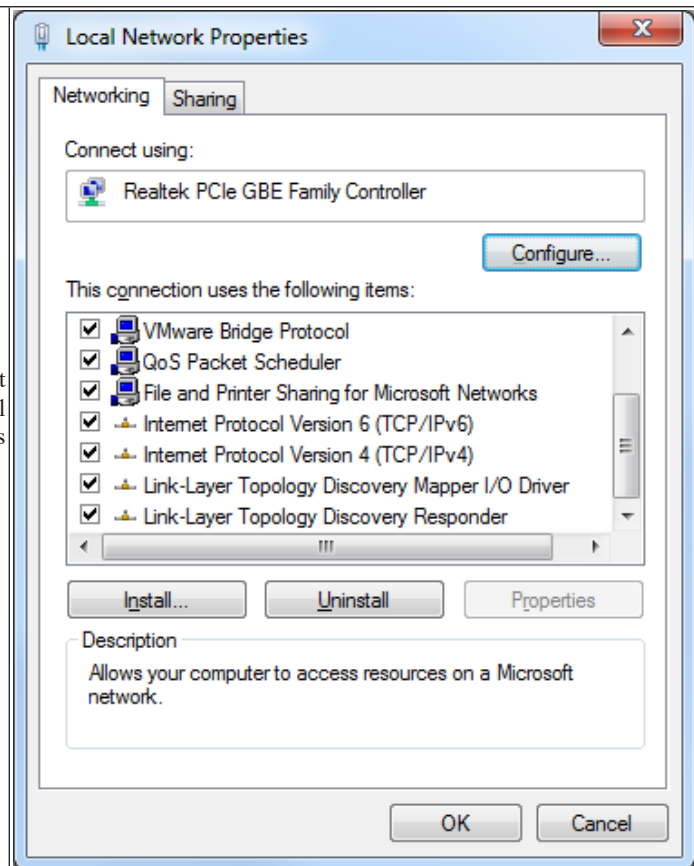|	
Setup physical connection Connect one end of Gigabit Ethernet Cable to Workstation, Connect another end to LAN port of External	
AP setup Set up the Wireless AP to: IP address 192.168.37.131 Subnet Mask 255.255.255.0 The setting process will be viable depends on AP model Here shows the Netgear Wireless Router setup	**LAN Setup** Apply ► ✕ Cancel Device Name R7000 **LAN TCP/IP Setup** IP Address 192 . 168 . 8 . 1 IP Subnet Mask 255 . 255 . 255 . 0 RIP Direction Both RIP Version Disabled ☑ **Use Router as DHCP Server** Starting IP Address 192 . 168 . 8 . 2 Ending IP Address 192 . 168 . 8 . 254 **Address Reservation** `#` `IP Address` `Device Name` `MAC Address` ➕ Add ✎ Edit ✕ Delete
Open local network management interface	

Right click the network adapter, select properties and entered the Local connection Properties window as shown left. Double click IPV4 item	**Local Network Properties** Networking | Sharing Connect using: Realtek PCIe GBE Family Controller Configure... This connection uses the following items: ☑ VMware Bridge Protocol ☑ QoS Packet Scheduler ☑ File and Printer Sharing for Microsoft Networks ☑ Internet Protocol Version 6 (TCP/IPv6) ☑ Internet Protocol Version 4 (TCP/IPv4) ☑ Link-Layer Topology Discovery Mapper I/O Driver ☑ Link-Layer Topology Discovery Responder Install... | Uninstall | Properties Description Allows your computer to access resources on a Microsoft network. OK | Cancel
Select "Obtain an IP address automatically"	**Internet Protocol Version 4 (TCP/IPv4) Properties** General | Alternate Configuration You can get IP settings assigned automatically if your network supports this capability. Otherwise, you need to ask your network administrator for the appropriate IP settings. ⊙ Obtain an IP address automatically ○ Use the following IP address: IP address: Subnet mask: Default gateway: ○ Obtain DNS server address automatically ⊙ Use the following DNS server addresses: Preferred DNS server: Alternate DNS server: ☐ Validate settings upon exit Advanced... OK | Cancel

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]

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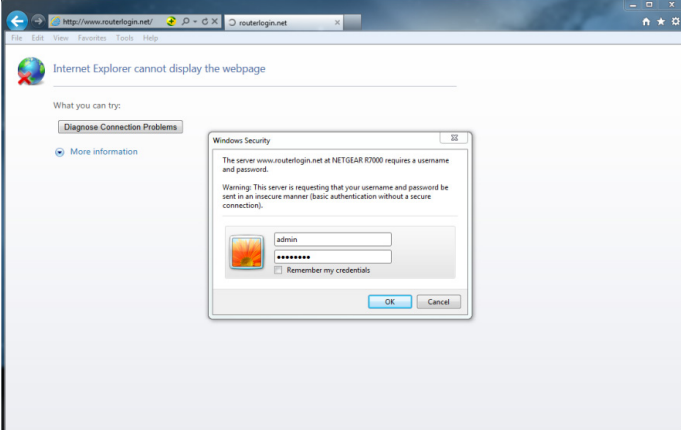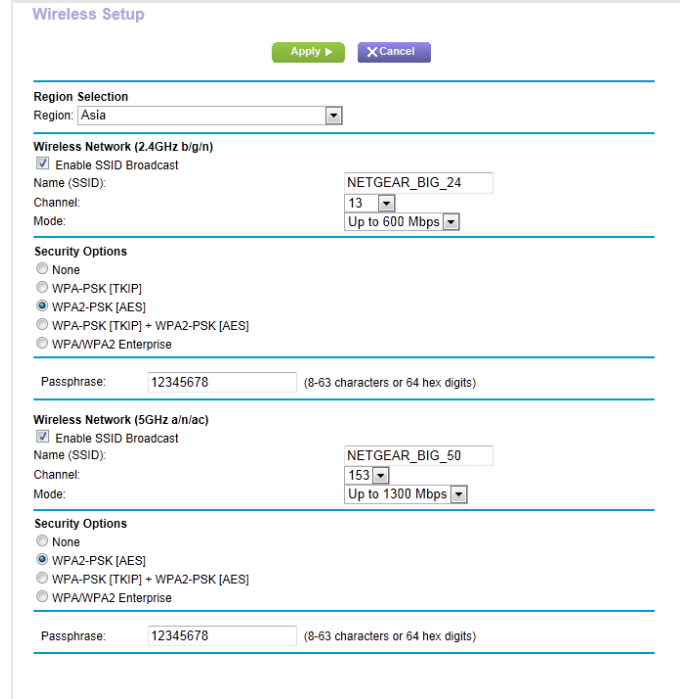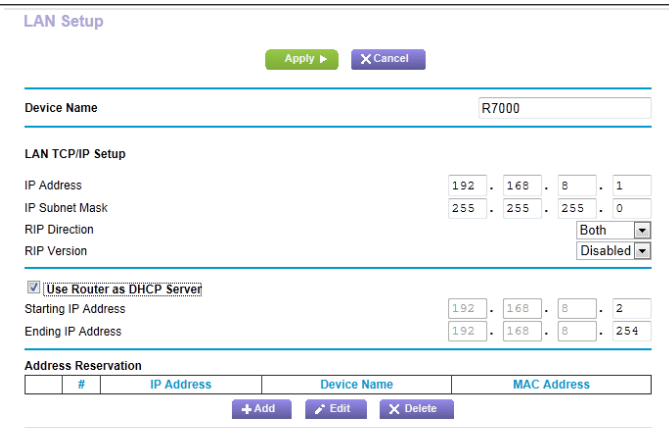|	
LAN setup Configure LAN IP address IP address: 192.168.8.1 Subnet Mask: 255.255.255.0 The AP setup is done	**LAN Setup** Apply ▶ ✕ Cancel Device Name R7000 **LAN TCP/IP Setup** IP Address 192 . 168 . 8 . 1 IP Subnet Mask 255 . 255 . 255 . 0 RIP Direction Both ▾ RIP Version Disabled ▾ ☑ Use Router as DHCP Server Starting IP Address 192 . 168 . 8 . 2 Ending IP Address 192 . 168 . 8 . 254 **Address Reservation** # IP Address Device Name MAC Address ✚ Add ✎ Edit ✕ Delete
Workstation IP setup After AP setup done, the user can setup the Workstation IP address Open local network management interface	
Right click the network adapter, select properties and entered the Local connection Properties window as shown left. Double click IPV4 item	

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Set the Default IP as follows: IP address：192.168.8.188 Subnet mask： 255.255.255.0	
The IP address should be identical with Cfg_HostIP item in work_dir\ Mars1417VS\config.ini file.	
Panel setup Either Wired Cable or AP mode can be used to configure detector To start configuration with wired cable. It is necessary to finish 4.4, then proceed to the steps below.	

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Connect panel to Workstation like 4.4	
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, numerical value occurred means the link is up and available.
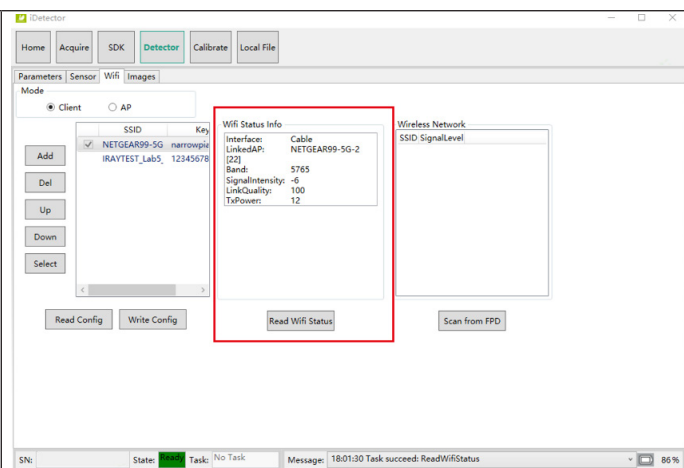
Since we have chosen default SSID and password, it would connect to wireless AP immediately after powered on next time.

iDetector interface

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 have little difference. If change, forgive us for not issuing a separate notice.

Users can refer to 903-341-14_iDetector_UserManual_EN_A4 for specific operation methods.

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	Configure parameters for detector.
Calibrate	Generate calibration files and manage the calibration files
Local File	Open and view local images.

HomePage

The main function in this page is to connect detector.

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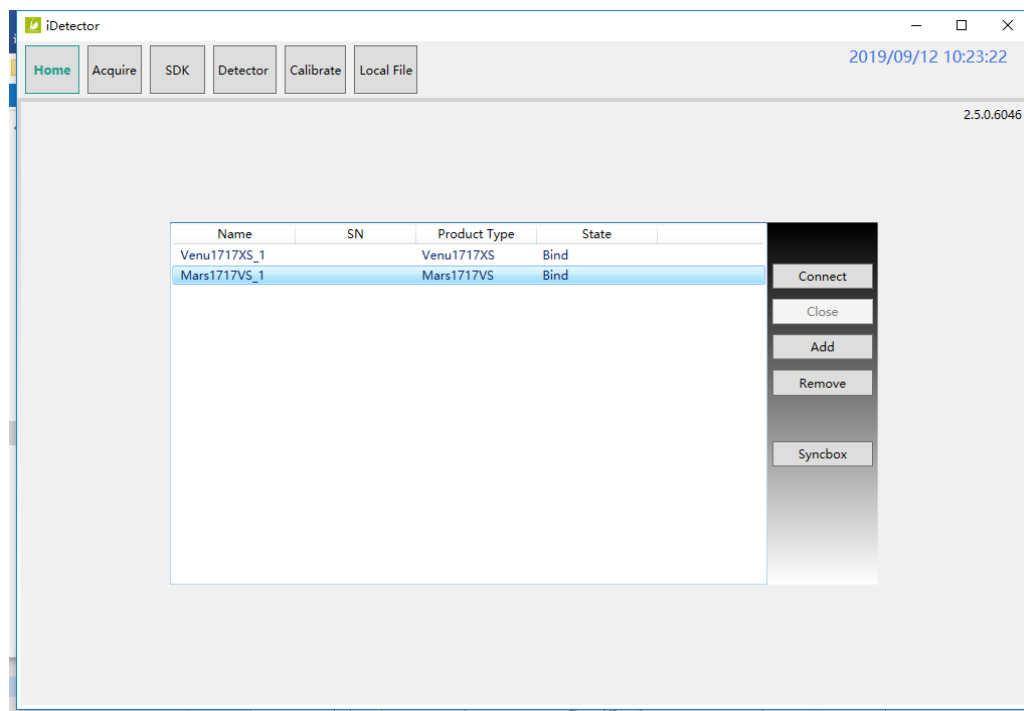
A

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.)

B

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)

C

The version of the SDK is displayed here, and the information will vary depending on the SDK version.

Acquire Page

This page is used to acquire image under different work mode, and user can choose correction mode too.

When acquire image finished there will be a preview image shown on the screen. The properties of image is displayed on the left of preview image. On the right of preview image 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 saved as raw, tiff or dicom formats. Both raw and tiff formats support single frame and continuous frames save.
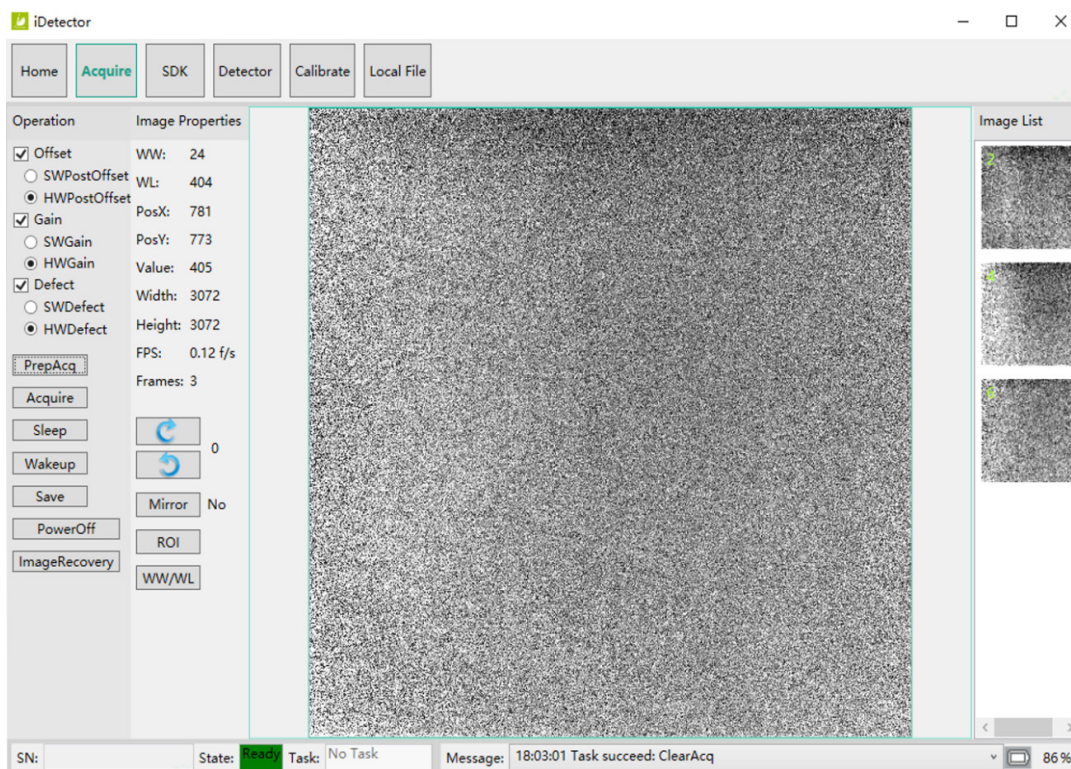
Status bar shows detector's serial number, the current task and state of detector, and feedback information of command. Status bar is also can be seen in other pages, and they are all same.

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

Functions in this Page.

Correction Menu		Description
Offset	HW-PostOffset	Do hardware PostOffset correction for image if checked (Only for Mars detector)
Gain	HWGain	Do hardware Gain correction for image if selected
Defect	HWDefect	Do hardware defect correction for image if checked (for Mars and Mercu detector)

Acqurie Button	Description
PrepAcq	Clear and acquire
Save	Save image, the format is raw and tiff
Poweroff	shutdown detector
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. Press "ctrl" key, can create several ROI areas.
WW/WL	Auto adjust WW/WL based on selected area by right button of mouse.
Image List	Show thumbnails

Detector Page

In Detector page, Detector Parameters, Sensor, Wifi and Images tab could be set.

Please refer to 903-341-14_iDetector_UserManual_EN_A4, for specific operation guide.

Calibrate Page

Offset, Gain, Defect calibrate files can be generated and managed in this page.

Please refer to 903-341-14_iDetector_UserManual_EN_A4, for specific operation guide. Users can also refers to chapter 5.2 for panel Correlation and Calibration tutorial.

Local Page

The idetector Software includes a local images display tool that allows users to look up local images. Please refer to 903-341-14_iDetector_UserManual_EN_A4 for specific operation methods.

Software Operation

Main Operation

Mars1417VS 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.

To Acquire X-ray image is the main operation of Mars1417VS. Most importantly, panel should build synchronization with X-ray generator. Mars1417VS is born with one way to acquire X-ray image that is Software Mode.

Steps for acquiring image

● Make sure the hardware is connected correctly and then power on.
● Once powered off, please wait at least 60s before power on again
● Wait until initialization is complete
● Connect the software
● choose the synchronization mode
● Generate HWPreOffset, Gain and Defect template after the detector reaches thermal equilibrium
● Acquire images in the selected mode

To Acquire X-ray image is the main operation of Mars1417VS. Most importantly, detector should build synchronization with X-ray generator. Mars1417VS has one synchronization mode to acquire X-ray image, which is Software Mode.

After Use

1. Disconnect the software
2. Power off
3. Keep it clean
4. Store under specified conditions
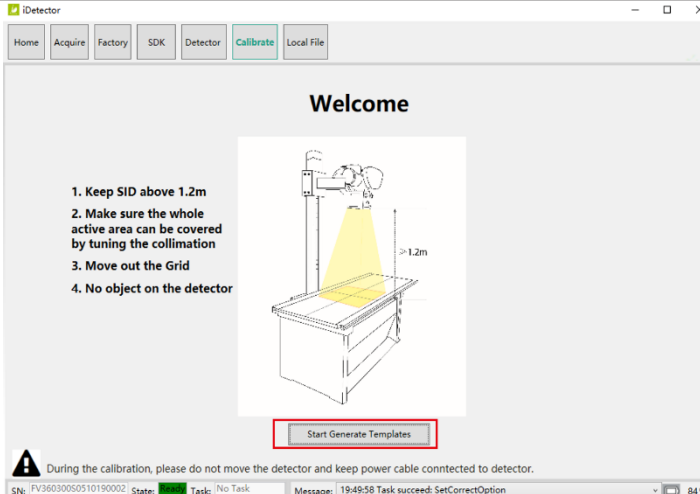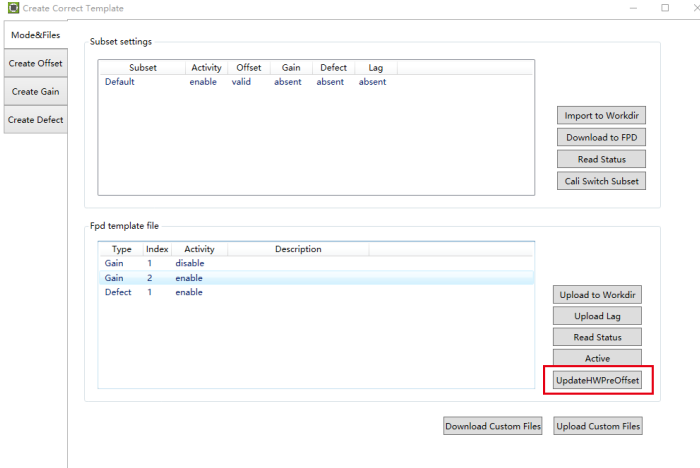
Correction and Calibration Template Generation

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.

Pre-offset Template Generation

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

Select "Calibrate" Click "Start Generate Templates"	
Click "UpdateHWPreOffset"	

Gain Calibration Template Generation

On Gain template generating page, there are 12 images that need to be got.

The operation process is as follows:

• Click "start" button

• Click "PREP", and start exposure

• After exposure, click "Acquire" to get the light image

• If the value meets the expected value, click "Accept", then get the other 11 images

• If the value does not meet the expected value, please do not click the "Accept", and adjust the exposure dose, then click the "PREP" to get light image again

• After getting 12 images, click "Generate" to generate gain template.

Notes: 1 please use hardware post offset correction.

Defect Correction Template Generation

The operation process is as follows:

• On the "Defect Calibration" page, start exposure, there are 8 images need to be captured;

• Click "Start" button

• Click "PREP", and start exposure

• After exposure, click "Acquire" to get the light image

• If the value meets the expected value, click "Accept", then get the other 7 images

• If the value does not meet the expected value, please do not click the "Accept", and adjust the exposure dose, then click the "PREP" to get light image again

• After getting 8 images, click "Generate" to generate gain template.
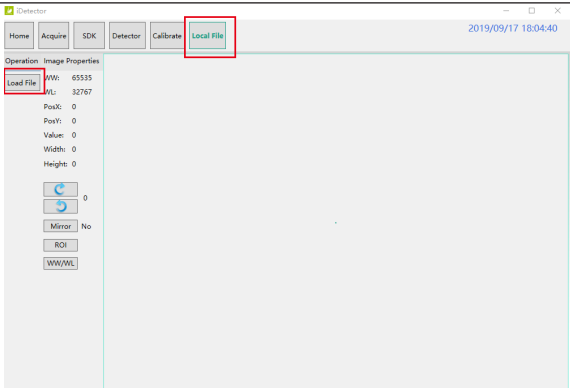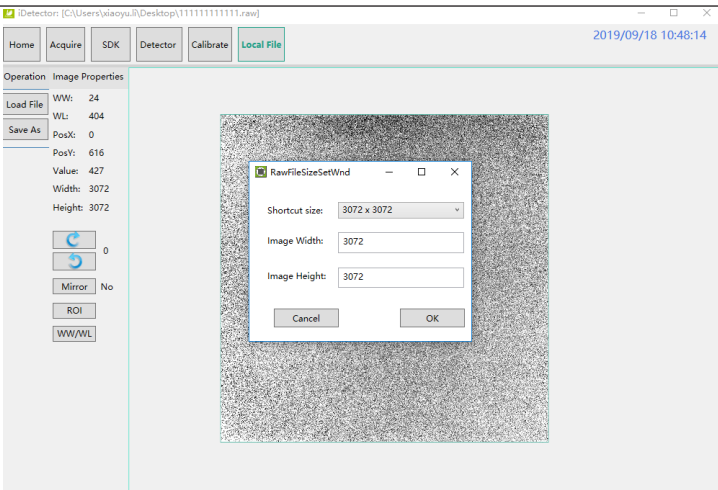
Note:

1. Please use hardware 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.

Local Image Check

"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.

Click "Local File" button in "Local File" UI, choose the specified file In this page user can open the image files saved in local, the file format can be raw, tiff, dft. When the software is disconnected to detector, the file still can be opened.	
Click "Load File", there will be an open file wizard. Select file and click open or double click the file. The tiff file will be opened directly. For the raw file or daft file there will be a dialog to select image size. Select correct size to open image files. If the file is not correct user will get an error message. Mars1417VS image size: 3070*3070	

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This page provides ROI tool, which can see the AVG, SNR, and other properties of the choosen image area by right mouse button.

This page provides WW/WL tool as Acquire page . Click this button to auto adjust WW/WL based on selected area by right button of mouse.
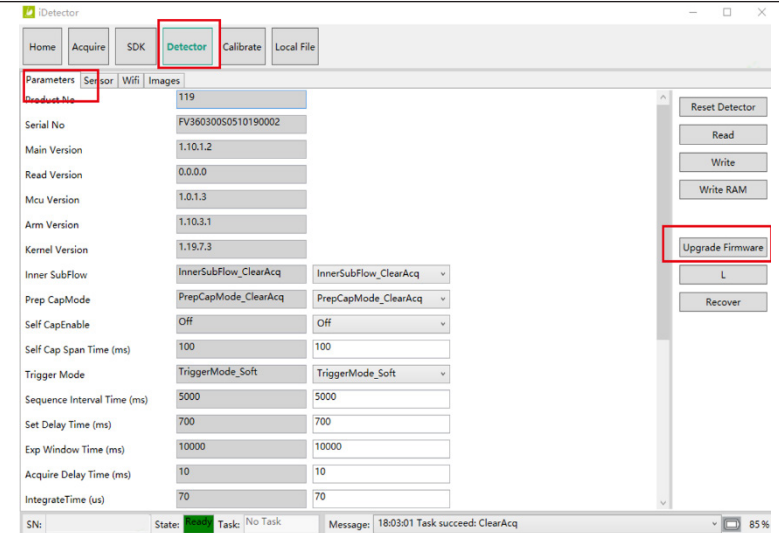
Image Properties& Image Process	Description
WW	window width
WL	window level
PosX	X coordinates of the current cursor at the point
PosY	Y coordinates of the current cursor at the point
Value	Value of the current cursor at the point
Width	Image width
Height	Image height
↻	Rotate the image clockwise, 90 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. Press "ctrl" key, can create several ROI areas.
WW/WL	Auto adjust WW/WL based on selected area by right button of mouse.
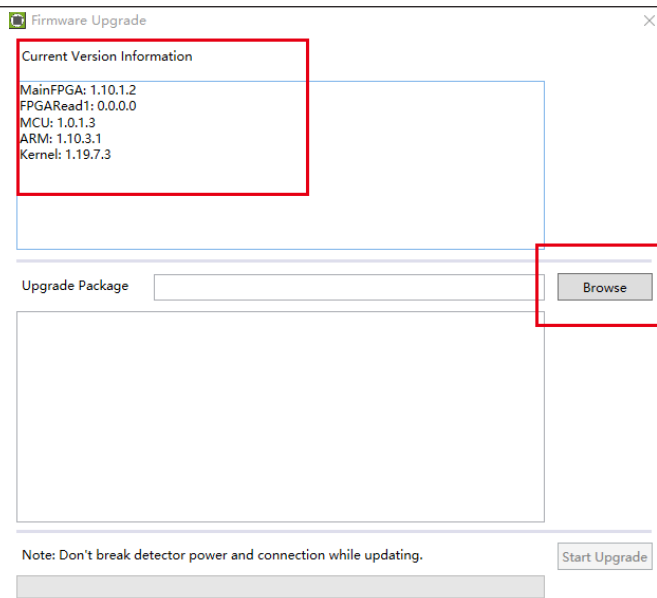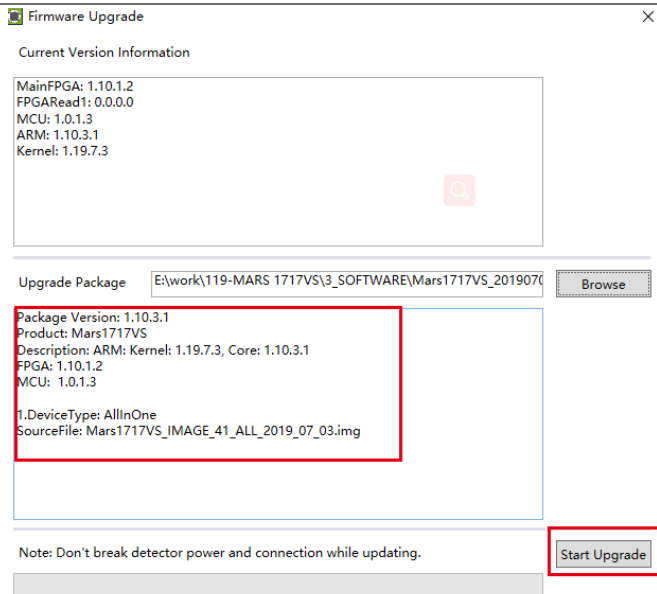
Firmware Upgrade

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

After connecting the detector, click the "Parameters" page in "Detector" User can enter the upgrade UI by clicking "Upgrade Firmware" 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	**Firmware Upgrade** ✕ Current Version Information MainFPGA: 1.10.1.2 FPGARead1: 0.0.0.0 MCU: 1.0.1.3 ARM: 1.10.3.1 Kernel: 1.19.7.3 Upgrade Package [ ] [Browse] Note: Don't break detector power and connection while updating. [Start Upgrade]
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	**Firmware Upgrade** ✕ Current Version Information MainFPGA: 1.10.1.2 FPGARead1: 0.0.0.0 MCU: 1.0.1.3 ARM: 1.10.3.1 Kernel: 1.19.7.3 Upgrade Package [E:\work\119-MARS 1717VS\3_SOFTWARE\Mars1717VS_201907( ] [Browse] Package Version: 1.10.3.1 Product: Mars1717VS Description: ARM: Kernel: 1.19.7.3, Core: 1.10.3.1 FPGA: 1.10.1.2 MCU: 1.0.1.3 1.DeviceType: AllInOne SourceFile: Mars1717VS_IMAGE_41_ALL_2019_07_03.img Note: Don't break detector power and connection while updating. [Start Upgrade]

Trouble Shooting

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

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Workflow

Block Diagram

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

```
        ┌──────────┐ ◄─────────────────────┐
        │   HVG    │                        │
        └──────────┘                        │
             │                              │
             ▼                              │
        ┌──────────┐                        │
        │  X-Tube  │                        │
        └──────────┘                        │
          │ │ │                             │
          ▼ ▼ ▼                             │
        ┌──────────┐      ┌──────────┐
        │   FPD    │ ◄───► │  Work    │
        │          │      │ Station  │
        └──────────┘      └──────────┘
```
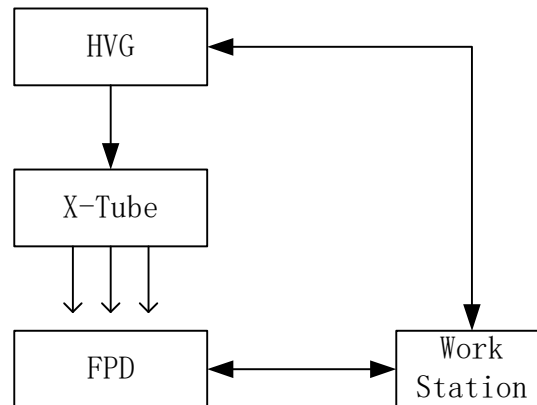
Workstation is a host device installed with iDetector and SDK. Chapter 3 has described how to establish connection between panels and workstation. In software mode, workstation does not control x-ray generator. Users would decide when to shoot x-ray.

Work flow

1. Click "PrepAcq"

2. Panel preparation, Wait until the warning message change from "Exposure Prohibit" to "Exposure Enable"

3. Shoot X-ray at any time. However the longer time you wait. The worse image would be. So please shoot once X-ray generator is ready.

4. Wait for image uploaded

Timing Setting

To set a clear scenario for programming, see diagram below for details
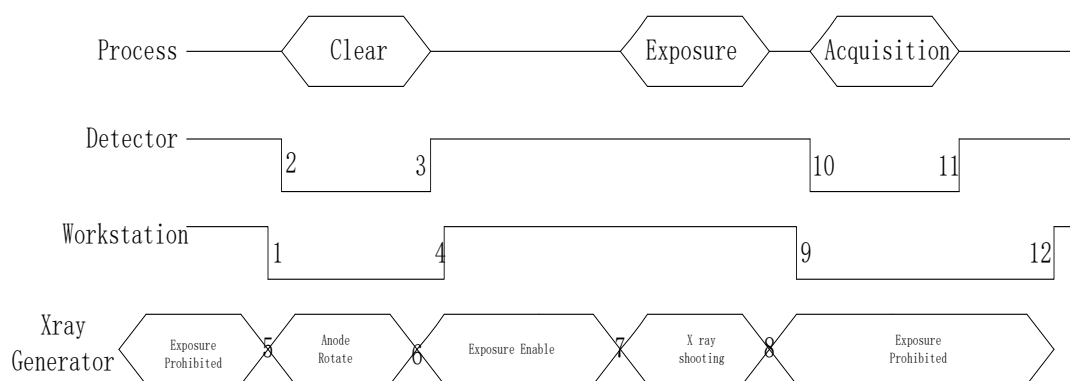
1. Workstation receives "prepacquire" request, send command "clear" to panel.

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. Time out, panel acquires data.

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

11. Workstation receives all image data from panel

If Hardware Post offset and Hardware calibration is selected, image got would be preview image. After step11, panel would do another dark image acquisition. With both light image and dark image, panel completes all the correction and calibration process. Finally, panel uploads processed image to workstation.

Regular inspection and maintenance

In order to ensure the safety of patients, operating person and third parties, and to maintain the performance and reliability of the equipment, be sure to perform regular inspection at least once a year. If necessary, clean up the equipment, make adjustments, or replace consumables such as fuses, detector cable, 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.

Daily

The following checks should be performed before and after use of this product.

| Item	Operation
Detector	Make sure there are no loose screws or cracks in the detector Make sure there is no dust and impurities attached to the battery connection pins Make sure there are no cracks or short circuits at the battery connection pins
Cables	Ensure that the cable is not damaged and the cable shell is not torn Verify that the power cord is reliably connected to the power socket of the detector
Battery (if needed)	Make sure there is no short circuit at the battery connection pins Make sure the battery is not expanding

Monthly & Annual Inspection

Item	Duration	Operation
Resolution	Monthly/yearly	Check detector resolution by resolution graphic or using phanton
linear	Monthly/yearly	Evaluate by examining the image gray value
Correction	Monthly/yearly	When the X-ray generator, tube, collimator or exposure environment changes

For the maintenance and overhaul involving the disassembly of the equipment shell, contact qualified service engineers. Please contact Shanghai iRay Service Department or your product distributors.

Technical Specifications

Detector
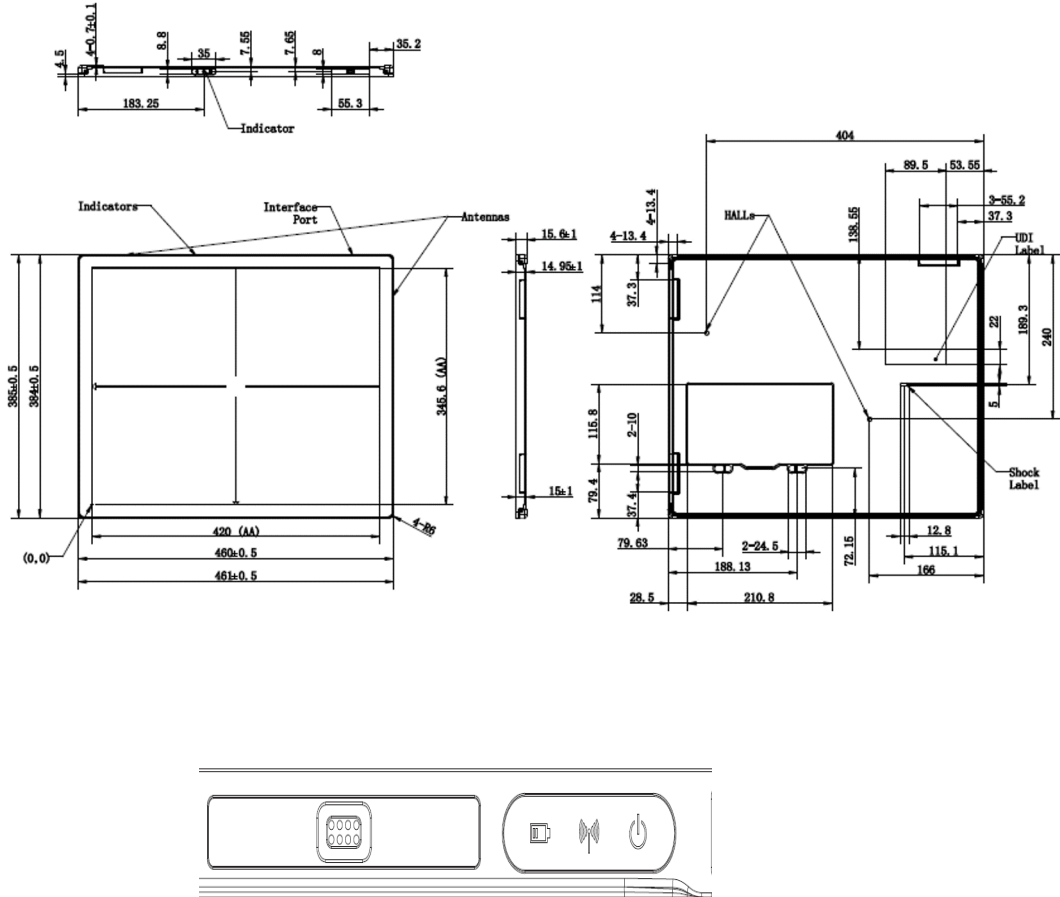
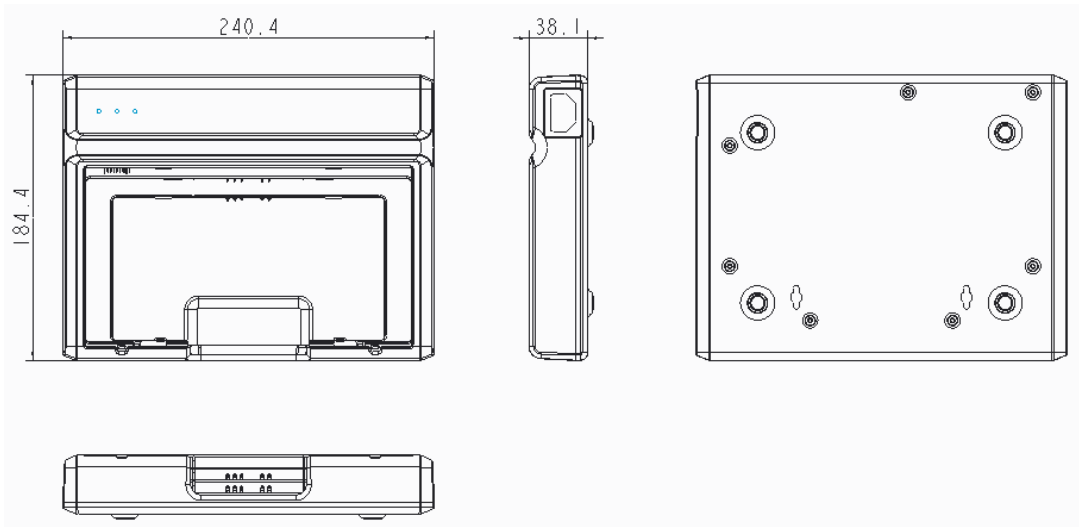| Item	Specification
Model	Mars1417VS-TSI (CsI)
Image Sensor	a-Si (Amorphous Silicon) TFT
Pixel Size	150μm
Effective Array	2304 x 2800
Effective Area (H x V)	345.6mm x 420mm
Gray scales	16bit
Limiting Spatial Resolution	3.3 Lp/mm without phantom or grid

Image Acquisition Time Client mode	Preview: <2.15 sec(typ) Processed: <5.1sec(typ)
Cycle Time	Min. 7.1 s
Power Consumption	Max. 20W
Dimension (L × W × H)	461 x 385 x 15.6 mm
Weight (with one battery)	≤3.7 kg
Image Transfer	Wireless: IEEE802.11 a/b/g/n/ac
Wireless Frequency Range	2.412~2.472GHz, 5.18~5.22GHz; 5.745~5.85GHz
Data Transmission Power	13dBm (Typ.) @802.11a 16dBm (Typ.) @802.11b 14dBm (Typ.) @802.11g 13dBm (Typ.) @802.11n HT20 11dBm (Typ.) @802.11n HT40 16dBm@2.4GHz 13dBm@5.8GHz
Wireless Modulation	11b: DSSS (DBPSK, DQPSK and CCK) 11a/g/n: OFDM (BPSK, QPSK,16QAM, 64QAM)
Wireless Band	2.4GHz≤40MHz 5.19GHz≤40MHz 5.8GHz≤40MHz
X-ray Energy	40kV to 150kV

Battery
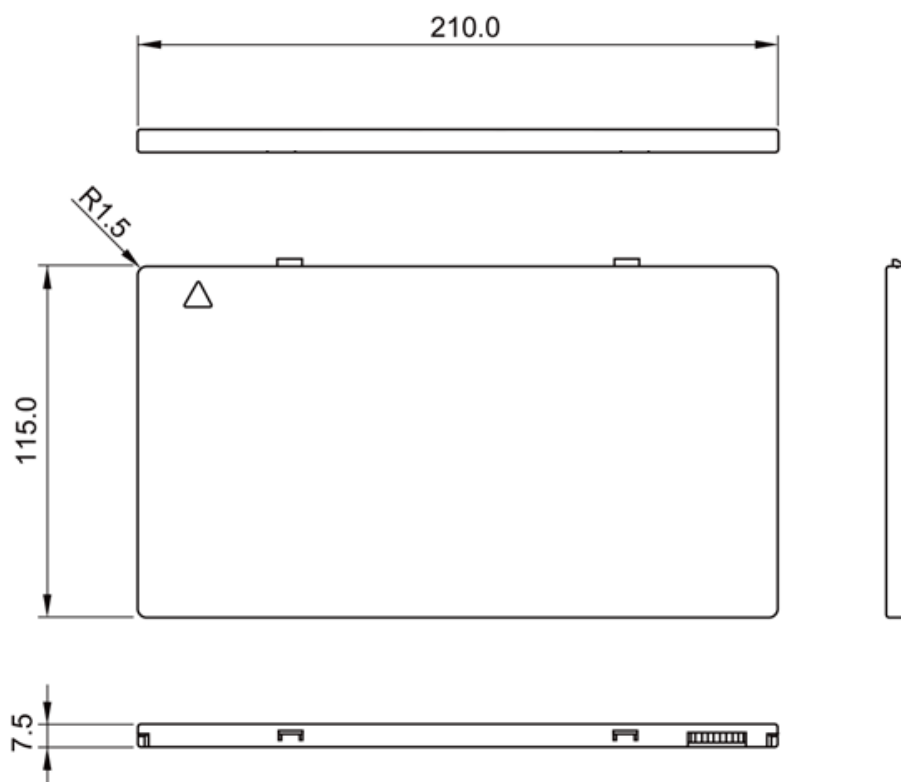
Item	Specifications
Model	Battery-KV
Rated Capacity	Typ. 4180mAh @ Discharge 0.2C
Nominal Voltage	10.8V
Charge Voltage	12.6±0.05V
Discharged End Voltage	9V
Charging Method	CC-CV
Operating Temperature	Charge 0℃-+60℃, Discharge-10℃-+60℃
Storage Temperature	-20℃-+45℃ (less than 3 months circle once) -20℃-+35℃ (less than 6 months circle once)
Relative Humidity	5%~95%
Dimension (L × W × H)	210 x 115 x 7.5 mm
Weight	0.28kg

Battery Charger

Item	Specifications
Model	Charger-Combo
Simultaneous Charging	1 battery packs
Full charging time	≤3 hours
Rated power supply	90~264V(AC)
Dimension (L × W × H)	240 x 184 x 38 mm
Weight	0.55 kg

Power supply

Mars1417VS supports Battery package input.

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

Use Environment

	Temperature	Temperature change	Humidity	Atmospheric Pressure	Pressure Change

Operating	5~35℃	<1k/min	10%~90% RH	700~1060hPa	<10kp/min (1kp=1.0197E-5Pa)
Storage	-10~55℃	<1k/min	10%~90% RH	700~1060hPa	<10kp/min (1kp=1.0197E-5Pa)

The Mars1417VS shall operate at an altitude specified not more than 3000m, the environment is only for detector.

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