Mars1717V3 Service Manual

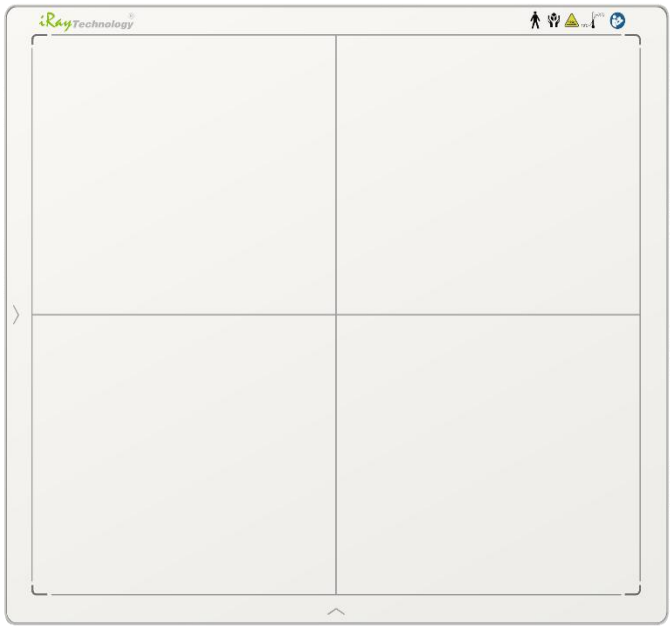


Table of Content

1 Summary

The reader of this article should be assured that have appropriated the knowledge of basic operation of FPD and enclosed software tools. This article focuses specifically on service, remote diagnosis, onsite trouble shooting, operation cautions and transportation notifications of Mars1417V3 series flat panel detector(collectively called ***FPD***), manufactured by iRay. Please refer to the product's user manual for instruction relating to safety, intended use and normal operation before do any repair work. The basic operations of software tools, such as connecting FPD, calibration, setting configuration could be found from the iDetector's user manual.

2 Glossary

2.1 iDetector

iDetector is an advanced software tool developed based on Software Development Kits (SDK) and is compatible with the latest firmware and multi-types of FPD. With the full new interface, it also optimizes the operation process and especially add smarter calibration guide than before. Please refer to 3.1 for iDetector function.

2.2 Calibration File & Type

All the calibration files are generated by iDetector, and divided into 2 types which are gain and defect.

Name	Format	Description
Gain	*.gn	Gain is used to remove the gain inequality of each pixel and keep the image uniform.
Defect	*.dft	Defect records the coordinate of the bad point or bad lines.

2.3 Calibration Mode

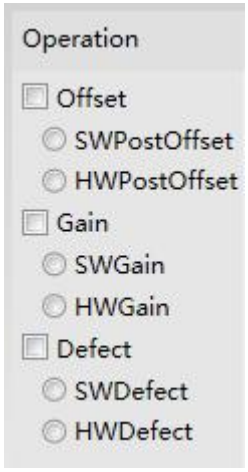
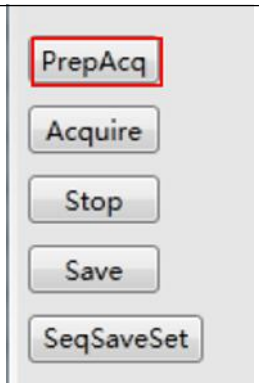
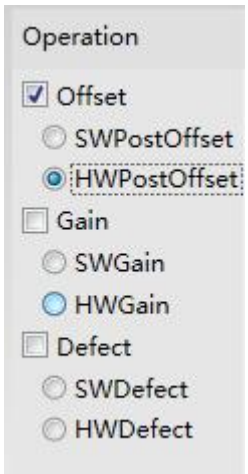
2.3.1 Software Mode (*SDK calibration*)

IDetector processes the original image with the calibration files (collectively called ***SDK calibration file***) stored in appointed directory, and the original image should be transmitted from FPD to PC before image processing.

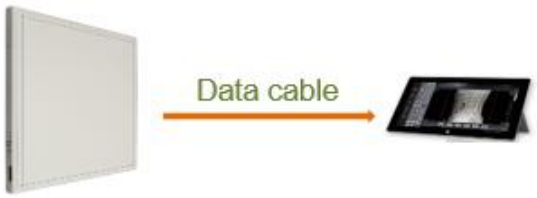
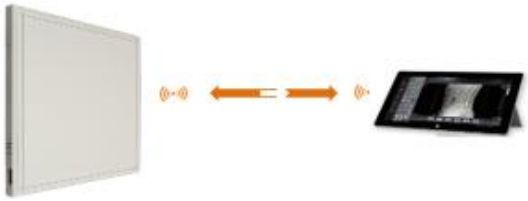
2.3.2 Hardware Mode (Hardware *calibration*)

The embedded system inside FPD processes the original image with the calibration date (collectively called ***FPD calibration file***) stored in FPD, and the processed image will be transmitted from FPD to PC.

2.4 Image Type

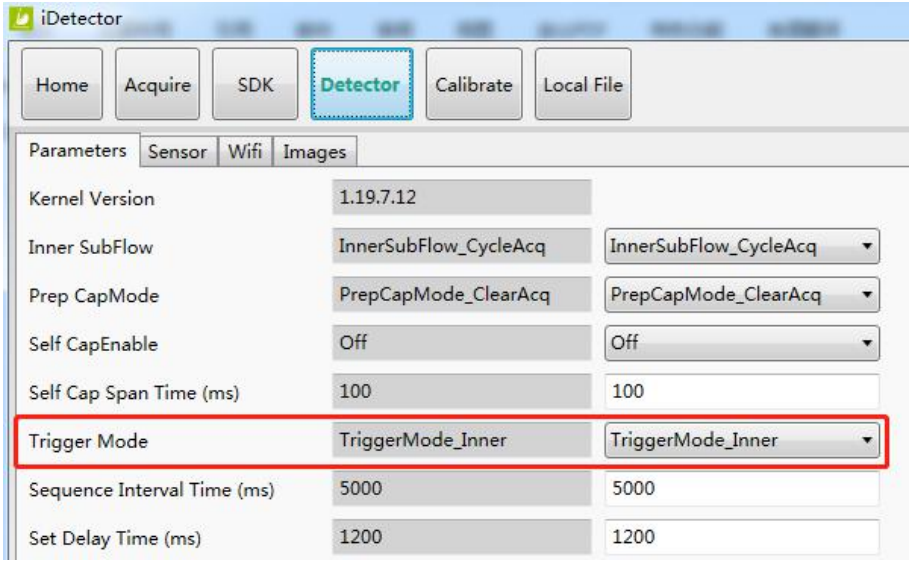
<table>
<tr><th>Image type</th><th>Description & Acquisition procedure</th></tr>
<tr><td rowspan="3">Original dark image</td><td colspan="2">Acquire image without any calibrations and exposure.
Set the calibration options as the following fig. for iDetector.</td></tr>
<tr><td> 
</td><td> 
</td></tr>
<tr><td colspan="2"></td></tr>
<tr><td rowspan="4">Post offset Dark image</td><td colspan="2">Add offset calibration and acquire image without exposure.
Set the calibration options as the following fig. for iDetector.</td></tr>
<tr><td>Hardware Mode</td><td rowspan="2"></td></tr>
<tr><td> 
</td></tr>
<tr><td colspan="2"></td></tr>
<tr><td>Original bright image</td><td colspan="2">Acquire image under exposure without any calibrations.
Refer to settings of original dark image to set the calibration options.</td></tr>
<tr><td>Post offset Bright image</td><td colspan="2">Add offset calibration and acquire image under exposure.
Refer to settings of dark image to set the calibration options.</td></tr>
</table>

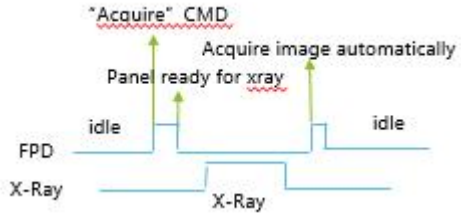
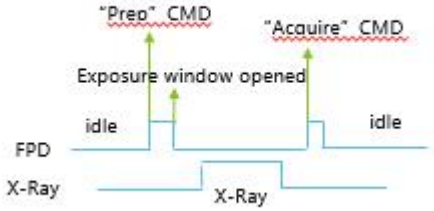
2.5 Wired, Client and AP connection

Wired Mode	
AP mode	
Client Mode	

2.6 Trigger Mode

Under Idetector---Detector Tab---Trigger Mode Options. FPD was Default set to TriggerMode_Inner.



Trigger Mode	Illustration	Application
Trigger Mode_Inner		Default settting. Panel was set to inner trigger during daily use.
TriggerMode_Soft		Panel was set to soft trigger mode before update the firmware and trouble shoot when panel have not trigger issue.

3 Common Tools

3.1 Enclosed Software Tools

#	Name	Function
1	iDetector	◆ Diagnose software initialization error. ◆ Image acquisition. ◆ Configure detector parameters ◆ Recover detector. ◆ Calibrate detector. ◆ Export log file.
2	Vcredist installation program	◆ Install runtime components of Visual C++ on a computer to ensure iDetector remains operational.
3	Microsoft .NET Framework 4.0	◆ Install Net Framework to ensure iDetector remains operational.

3.1.1 How to Get iDetector

The iDetector is stored in the root of the software package in enclosed CD.

1	Vcredist installation program
2	iDetecto

Fig. 1 Storage Path of iDetector

3.1.2 How to Get Microsoft .NET Framework 4.0

Please download it from Microsoft official website.

3.2 Onsite Support Tools

Item	Spec.	Function
Multimeter	Voltage & Conductive function included.	◆ Cable conductive inspection ◆ Voltage measurement
Laptop	Wireless frequency: 2.4GHz & 5GHz Ethernet Card 1000M	◆ Run enclosed software tools ◆ Wireless communication test @ AP mode
AP Router	Specified in user manual	◆ Wireless commotion test @ Client mode
Data Cable (FPD Accessory)		◆ Wired communication test @ Wired mode ◆ Reconfigure Wi-Fi setting.
Dosimeter (Optional)	No special filter requirement	◆ Exposure dose inspection ◆ Check the exposure parameter
Crosshead Screwdriver	PH1	◆ Take screw of from the type C data port

4 Basic Service Operation via iDetector

4.1 Export Log

4.1.1 Export SDK Log

- Connect FPD via iDetector and enter "**SDK**" interface.
- Choose "**LogLevel_Debug"** (#1 in fig.2) and click "**Set**" button (#2 in fig. 2) to save the settings.

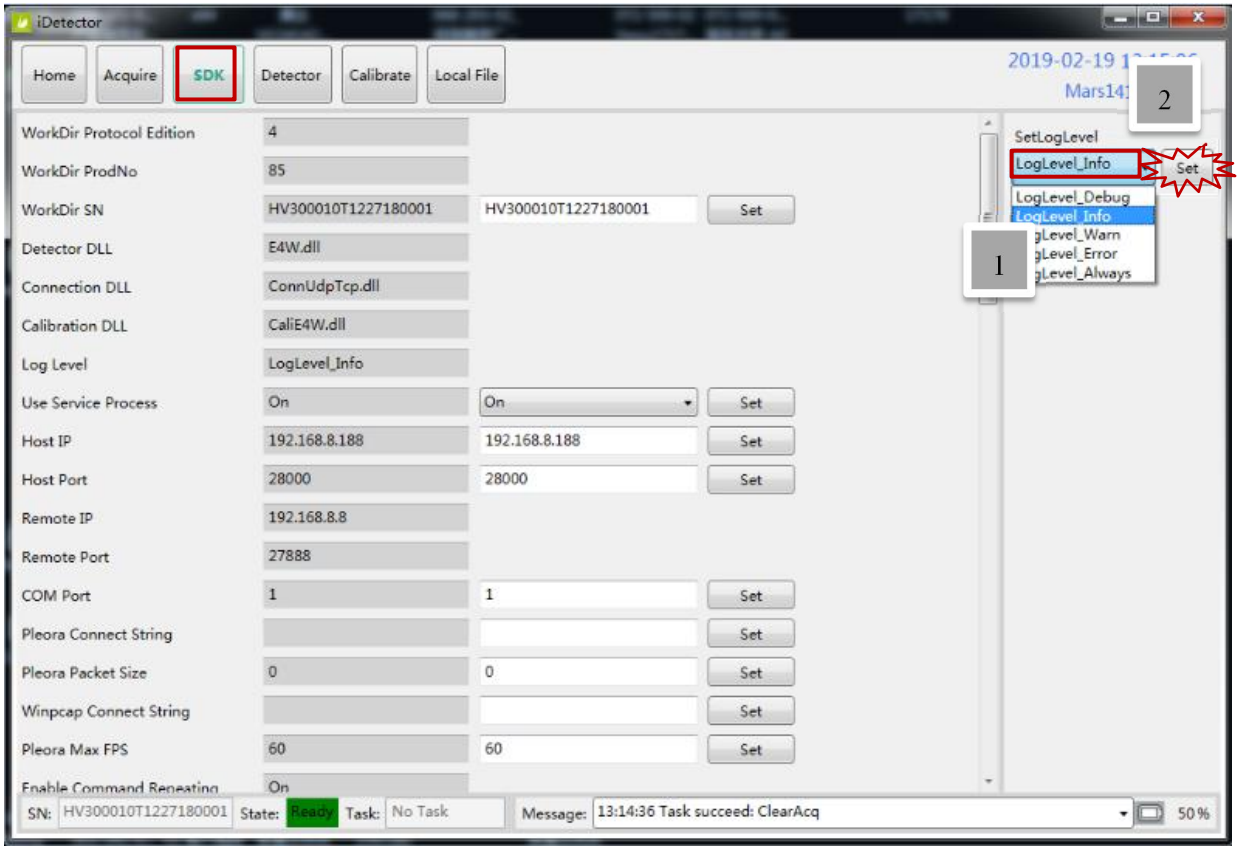
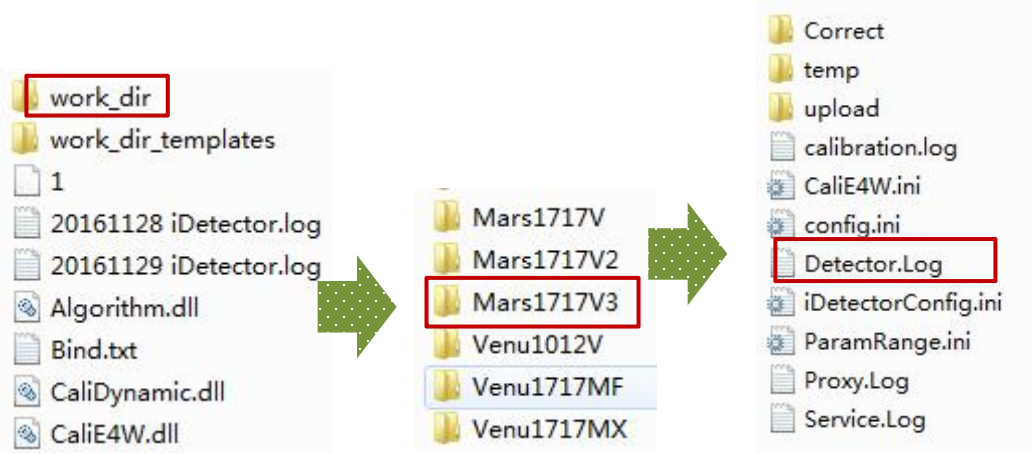


Fig. 2 Set log level

◆ The log file **Detector.Log** will be stored at the root of the iDetector.exe (Fig. 3).



LogLevel_Debug	Highest level, and hard disk IO resource will be saved

Fig. 3 Storage path of SDK log

Caution

- Set log level to "**LogLevel_Info**" for saving disc space after diagnosis is completed.
- Log level_Info means sdk only record basic information of the panel. Log level_Debug is for troubleshooting purpose.

4.1.2 Export FPD log

- Connect FPD via iDetector and enter "**Detector**" interface.
- Click "L" button , detector log will upload to the computer(#1 in Fig.4).
- Log file **ARMLog.INFO.tar.bz2** was saved in the root directory where workdir located (Fig 4).

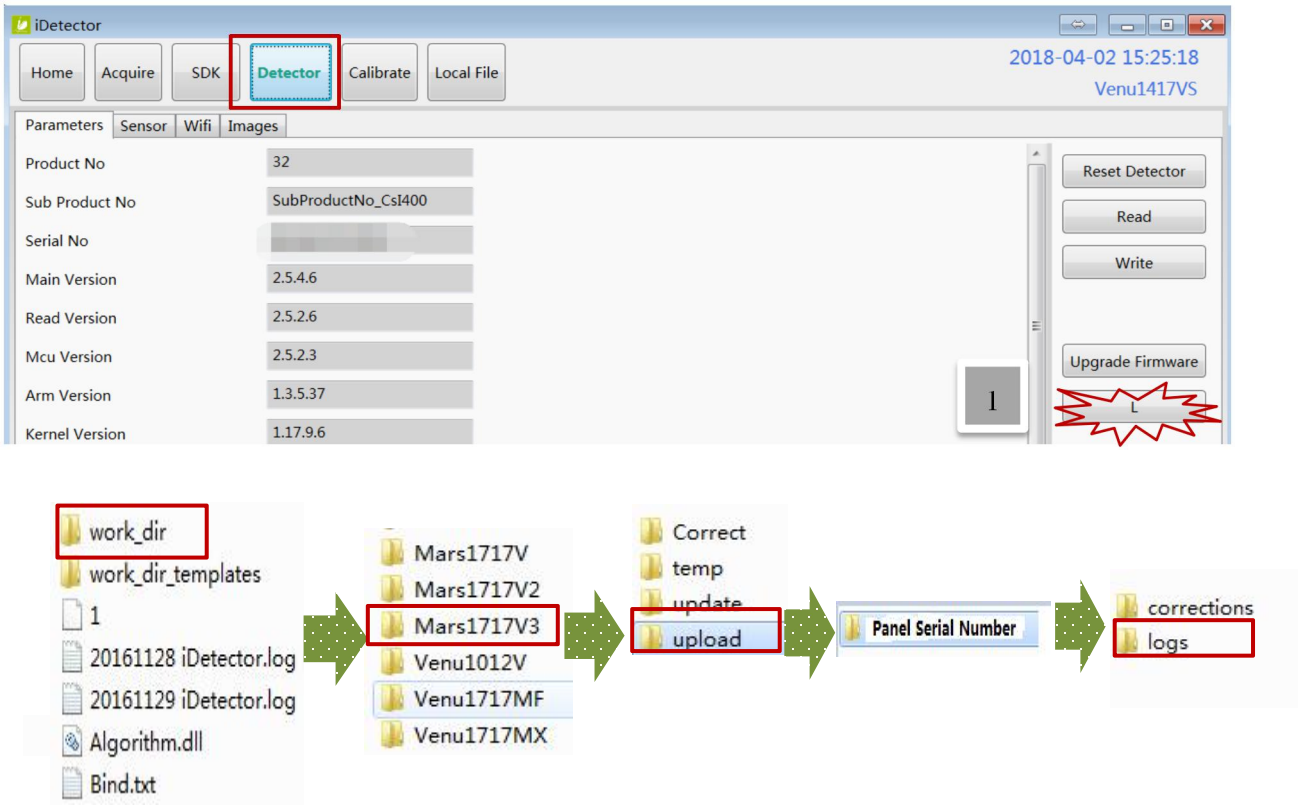


Fig. 4 Export FPD log

4.2 Export Calibration File

4.2.1 Export SDK Calibration File

- Go to the SDK installation file and open work_dir
- Under Default to find the gain_2304x2844.gn and defect_2304x2844.dft

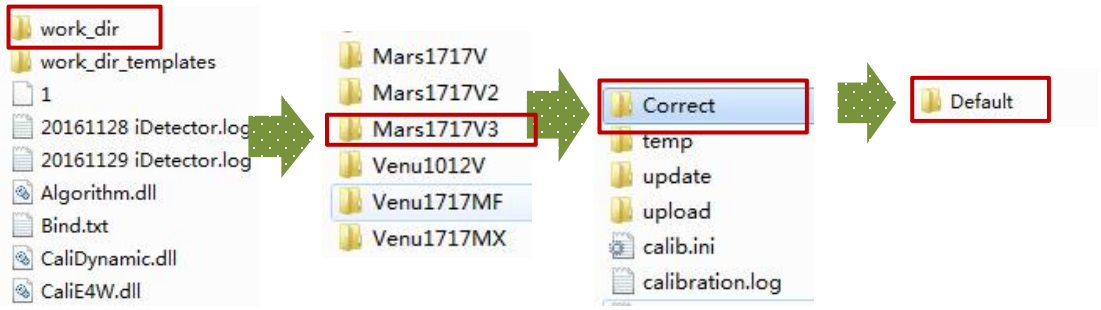
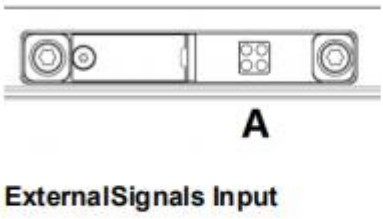


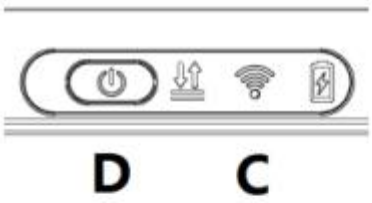
Fig. 5 Storage path of SDK calibration file

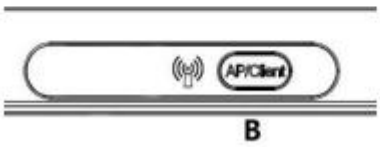
5 Basic Service operation of FPD

5.1 FPD Service Interface

5.2 FPD Indicator Definition







Item	Name	Description
A	DC Input	24V DC input
B	AP/Client Switch	Refer to user manual 3.1.5
C	Detector Indicator	Detector indicator of control panel
D	Power Button	

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

Power Indicator	Lighting Status	Operating Status		
		Operating	Battery Capacity	DC Input

OFF		Power OFF	/	/
Orange ON		Power ON	≤20%	NO
Green ON		Power ON	● Battery capacity ≥20%, no DC input ● DC input , no Battery	
Orange Blinking		Power OFF	<20%	YES
Green and Orange Blinking		Power OFF	≥20% and <95%	YES
Green Fast Blinking		Power OFF	≥95% and <100%	YES
OFF		Power OFF	=100%	YES

5.2.2 Link indicator is as table:

Link Indicator	Lighting Status	Description
OFF		● Shut down ● wired connection broken and wireless connection not ready
Green ON		● Wired Connection is built
Blue ON		● Client mode, wireless connection is built ● AP mode, wireless AP is ready
Blue Blinking		● Client mode, no connection is built
Green and Blue Blinking		● Initialization

5.2.3 Status indicator is as table:

Status Indicator	Lighting Status	Description
OFF		● Shut down ● Exposure prohibit
Green ON		● Exposure enable
Green Blinking		● Image transmission
Orange ON		● Error
Orange Blinking		● Safety mode

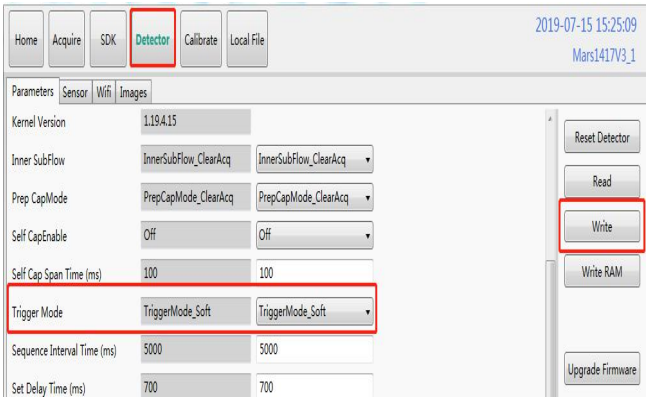
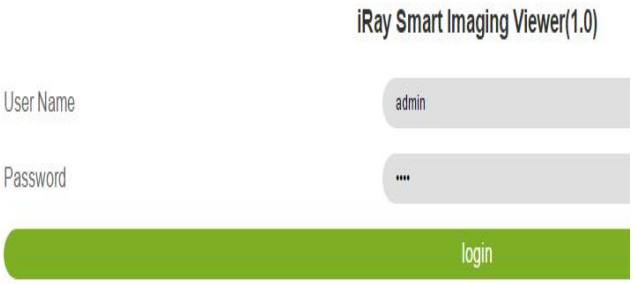
5.2.4 AP/Client indicator is as table:

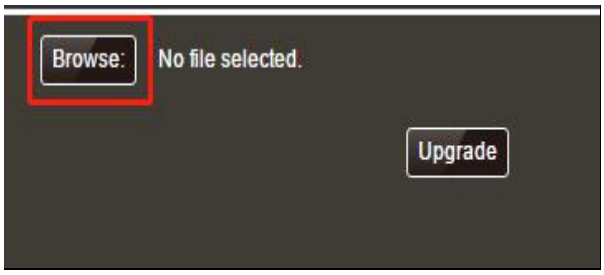
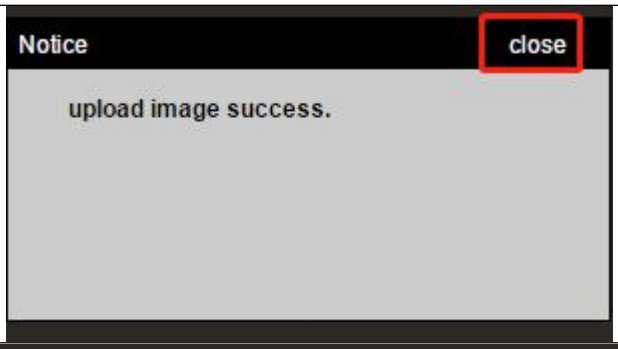
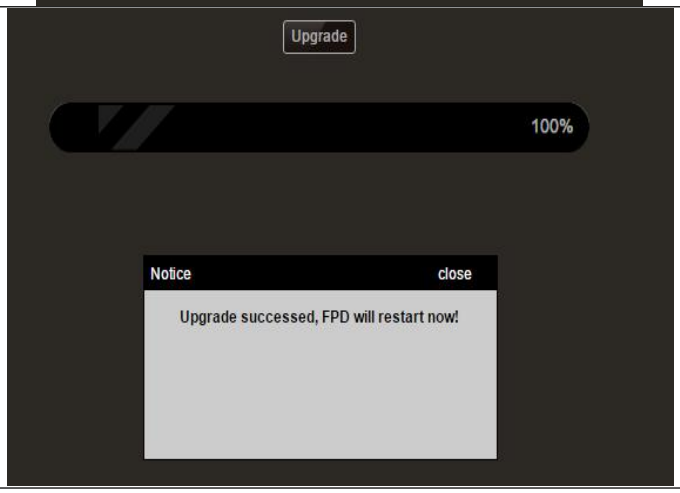
Mode Indicator	Lighting Status	Description
OFF		• Power OFF • Wired Connection(Service only)
Green ON		• AP Mode Connection is built
Blue ON		• Client Mode connection is built

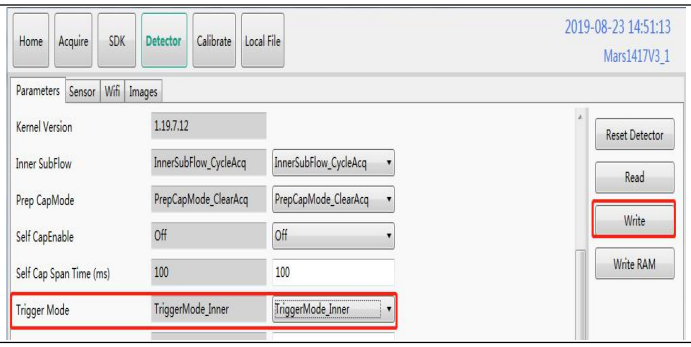
5.3 Update Firmware via Web

Caution

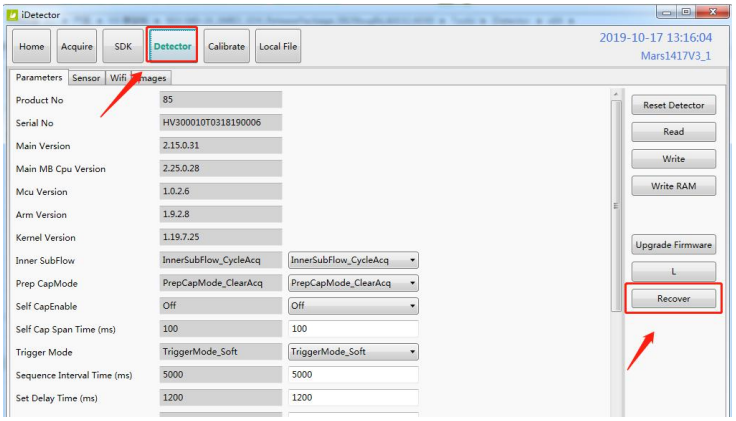
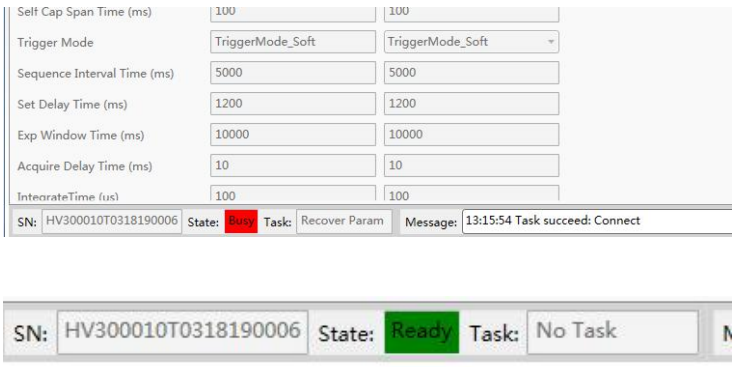
- There is no low power alarm during updating firmware on Web, please insert external charge cable into the charge port before doing upgrade or use battery with more than 80% capacity.
- The Update procedure will take about 20 minutes.

Connect the panel to the Idetector.exe and change the trigger mode to TriggerMode_Soft and Click “Write”	
Open IE browser. Type in http://192.168.8.8 at web browser address field. **User name:** admin **Password:** admin	
Click  button to enter into “**Advanced**”	

Click “**Upgrade**” to enter into update interface	
Click “**Browse**” to choose the file	
Choose” *.ifrm” Click “**upgrade**” to initial update process.	
Click “**close**” when “**upload image success**” pops up.	
Wait until upgrade is done.	

Set the panel trigger mode back to TriggerMode_Inner and Click “Write”	

5.4 How to reset the panel to default settings.

Connect the panel to the Idetector.exe and change the click the recover button under detector tab.	
Wait the state from busy to ready	

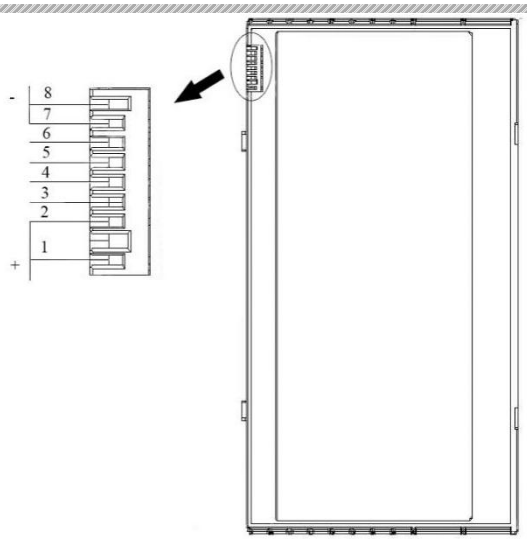
6 Basic Service Operations of FPD Accessories

6.1 Battery

6.1.1 Inspection

Note: Place the battery into the charger to exit the ship mode first.

Step	Action	
1	Refer to the fig. 10 for testing the voltage between P+ and P-.	
	Less than 9V. jump to step 3.	About 9V, battery has no fault.
2	Put the battery into charger.	
	Not charging or charging and charging full indicator both blinking. Jump to step 3.	Charging. The battery is low capacity.
3	Replace battery	



Pin	Symbol	Description
1,2	P+	Battery positive terminal
7,8	P-	battery negative terminal

Fig 10 Pin definition of battery

6.1.2 Battery Ship Mode Switch

To ensure the safety of the battery during transportation or storage, the battery can be set to ship mode, that is, the battery is locked without voltage output. So, it needs to exit ship mode before using the battery for the first time

- Exit ship mode
- Place the battery in the battery charger.

6.2 Charger

1	Check whether the charger power indicator is on?	
	Yes, jump to step 2.	No or blinking, jump to step 3.
2	Place the known good battery into the charger.	
	Charging and charging full indicator are both off. Jump to step 3.	Charging, The charger power indicator is bad.
3	Replace battery charger.	

Item	Name	Description
A	Power Indicator	/
B	Charging Indicator	/
C	Charge Full Indicator	/

Fig. 11 Battery Charger

7 Trouble Shooting for FAQ

7.1 Power On Failure

Note

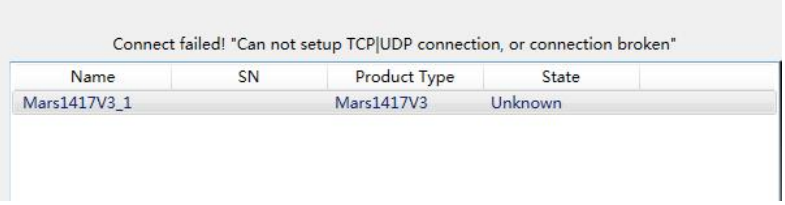
- The power indicator does not light up.
- Cannot connect FPD via iDetecor

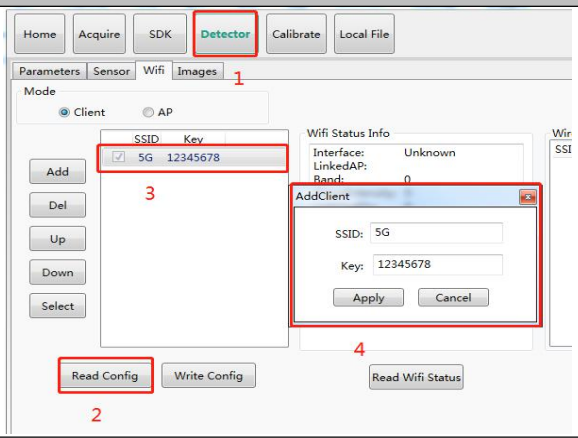
Step	Action List	
1	Replace the battery	
	Not work, jump to next step	Issue is resolved, Low power
2	Contact Technical Support.	

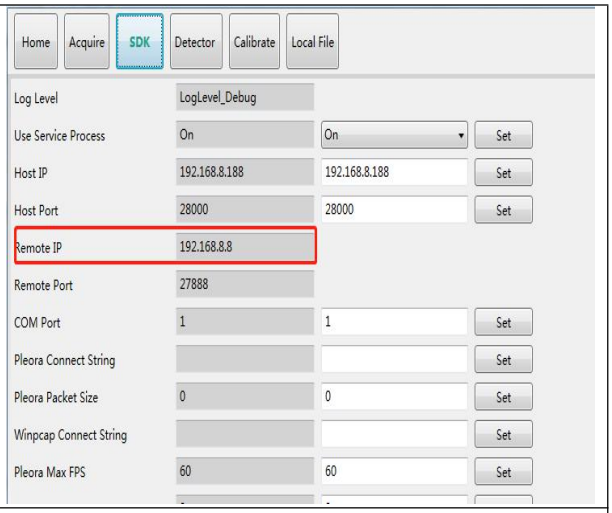
7.2 Connection Issue

Note

- The FPD is connected with work station through router
- The IP address of workstation is 192.168.8.188
- Fail to connect FPD with iDetector.exe.



Step	Action List	
1	Checking the link indicator of FPD. Link indicator blue is blinking.	
2	Ping the router IP	
	Work, jump to next step.	Not work, check the computer IP and network cable
3	Check the router wireless setting	
	Correct, jump to next step	No, Set the correct wirelss setting
4	Connect the panel with Data cable and check the panel wireless setting.	
	Same as the router then replace the router or panel or contact technical support.	Different with the router, Set it to the correct setting.

5	If the panel can not conect to the data cable, go to SDK tab check the “Remote IP” of the panel.	
	Contact the technical support if panel still can not connect after set the Host IP to align with the remote IP.	

7.3 Acquire a dark image after exposure

Note

- FPD acquire the image with all the calibrations after exposure.
- The gray value of the image is close to 400.

Step	Action List	
1	Check the trigger configuration of FPD, is the trigger mode Inner?	
	Yes, jump to next step.	No, Switch to inner mode.
2	Contact Technical Support	

7.4 No Image Acquired after exposure

Note

- The FPD does not acquire image automatically after click Acquire button and exposure within inner trigger mode.

Step	Action List	
1	Reboot the panel	
	Not work, jump to step2.	Issue is resolved
2	Set the panel to Soft trigger mode. Click “Prep” then Exposure(70kv 5mAs). Click “Acquire” after shoot xray.	
	Get a bright image. Jump to step 4	Get a Dark image.
3	Whether the Xray machine do emit the xray ?	
	Yes, Jump to step 4	No, Repair the xRay machine
4	❑ Contact Technical Support	

7.5 Acquire Image without Exposure.

Note

- X-ray machine does not emit X-ray, but the FPD automatically acquire image after click “Acquire”.
- The trigger mode is Inner.

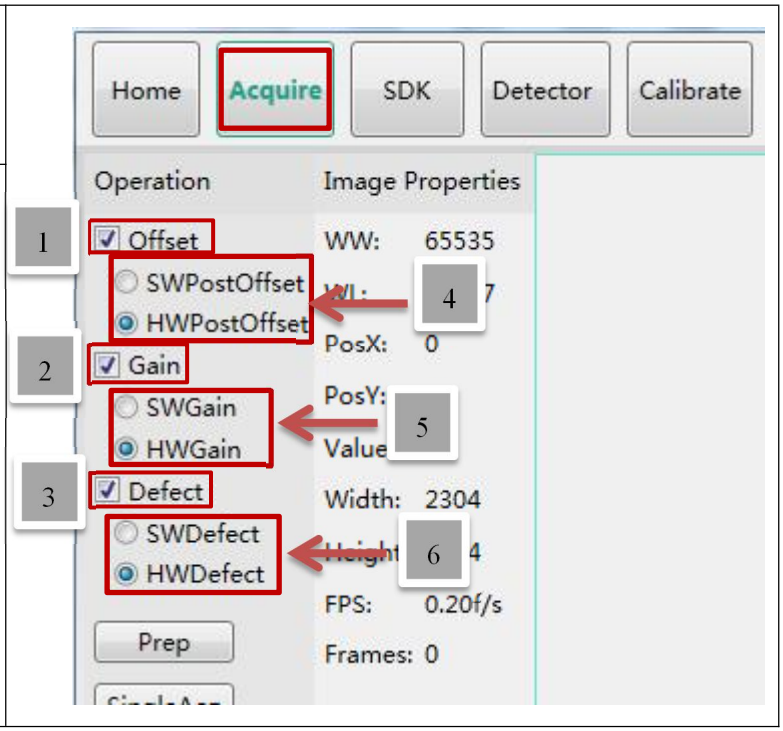
Step	Action List	
1	Reboot FPD	
	Not work, jump to next step.	Issue is resolved Check the error log
2	Contact supplier and provide the following information The SDK log file and FPD Log file when issue happen.	

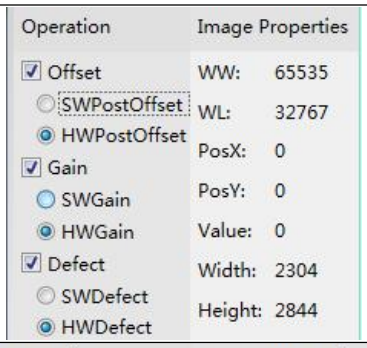
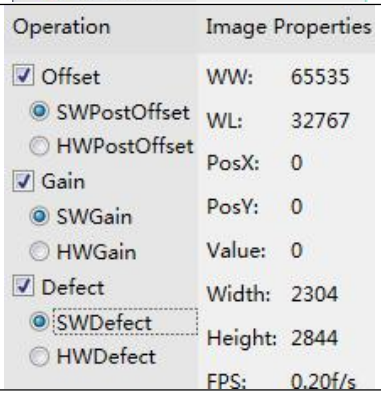
7.6 Analysis of Abnormal Images & Operation for Image Analysis

7.6.1 Switch Calibration Mode

Note

- Please set the calibration mode to hardware or software.

Connect FPD with iDetector and enter into “**Acquire**” interface.	
Select the calibration file, e.g. **Offset**, **Gain**, **Defect** (#1&# 3) and set the **calibration mode** (#4&#6).	

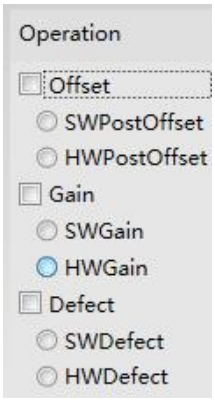
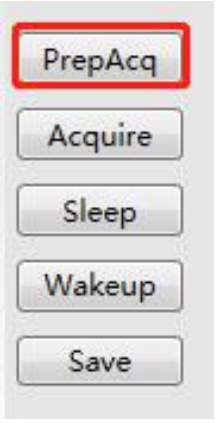
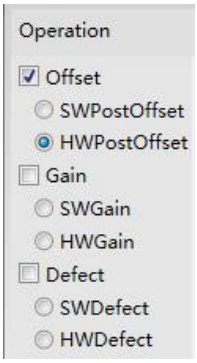
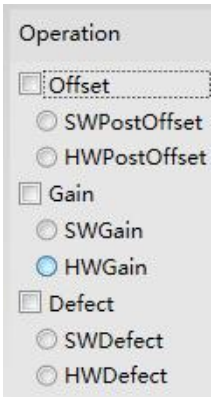
All in hardware mode.	
All in software mode.	

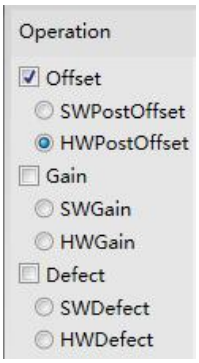
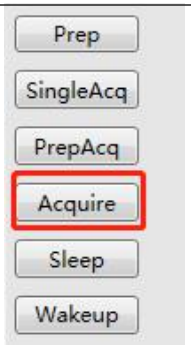
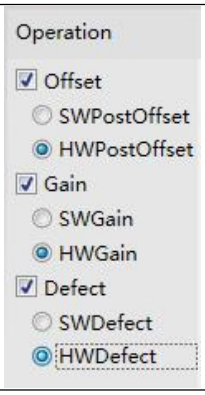
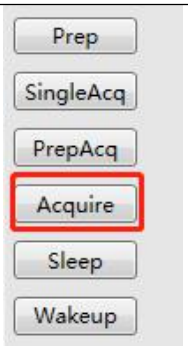
SWPostOffset	Post Offset calibration is done by SDK
HWPostOffset	Post Offset calibration is done by FPD
SWGain	Gain calibration is done by SDK
HWGain	Gain calibration is done by FPD
SWDefect	Defect calibration is done by SDK
HWDefect	Defect calibration is done by FPD

Fig. 12 Calibration Method Switch

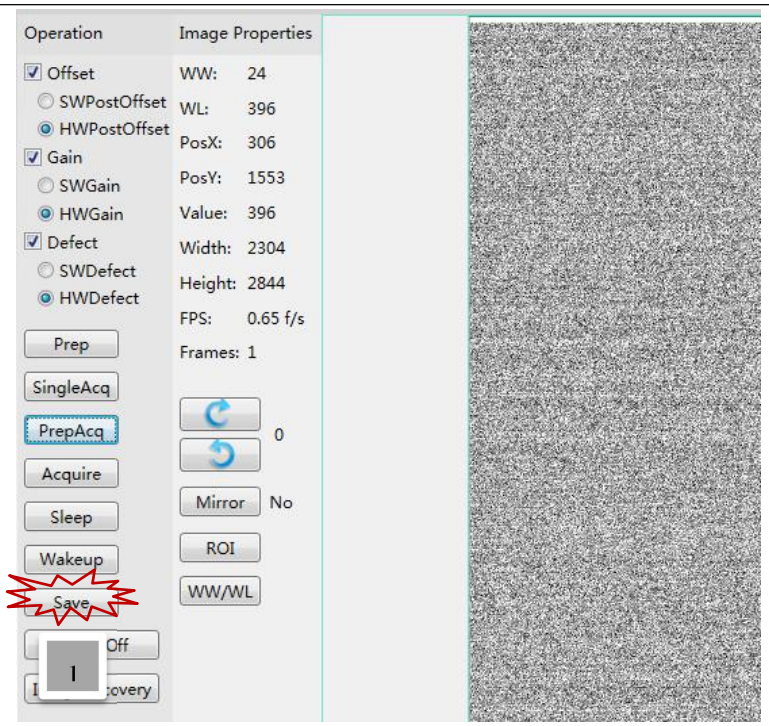
7.6.2 Acquire Image for Analysis

Image Type	Descriptions & Acquire procedure
Original dark image	Set the calibration settings as below，click “**PrepAcq**” button to get an image without exposure.

		
Post offset Dark image	Set the calibration settings as below， click “**PrepAcq**” button to get an image without exposure.	
	Hardware calibration 	
Original Bright image	Add offset calibration and click “**Acquire”** button, Then shot the panel with 70KV 5mAs	
		
Post Offset Bright image	Add offset calibration and click “**Acquire**” button , then shot the panel with 70KV 5mAs	

		
Bright Image with All the Calibration	Add all the calibration and click "**Acquire"** button, Then shot the panel with 70KV 5mAs	
		

7.6.3 Save an Image

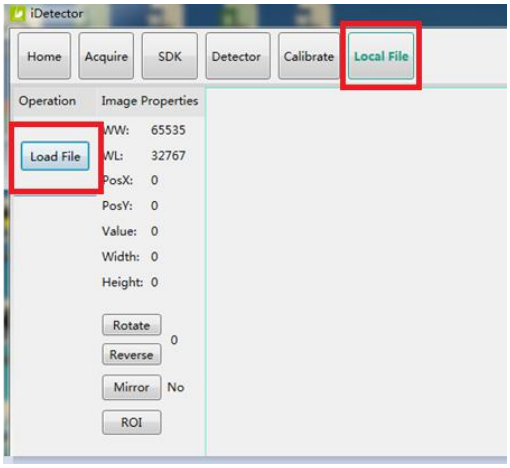
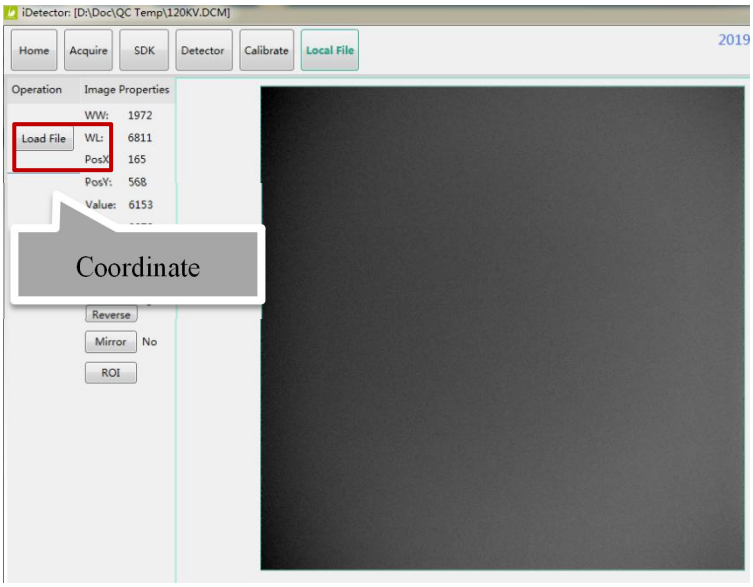
Click Save button(#1)	

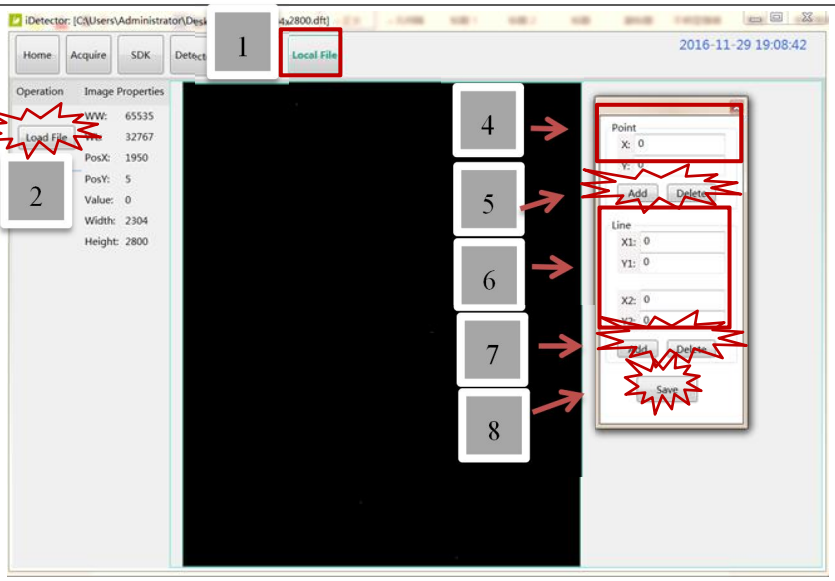
Save the image to dicom format	

7.6.4 Add the defect point & Line Manually

Note

- Proceed this operation once the defect line and defect point is not recognized.

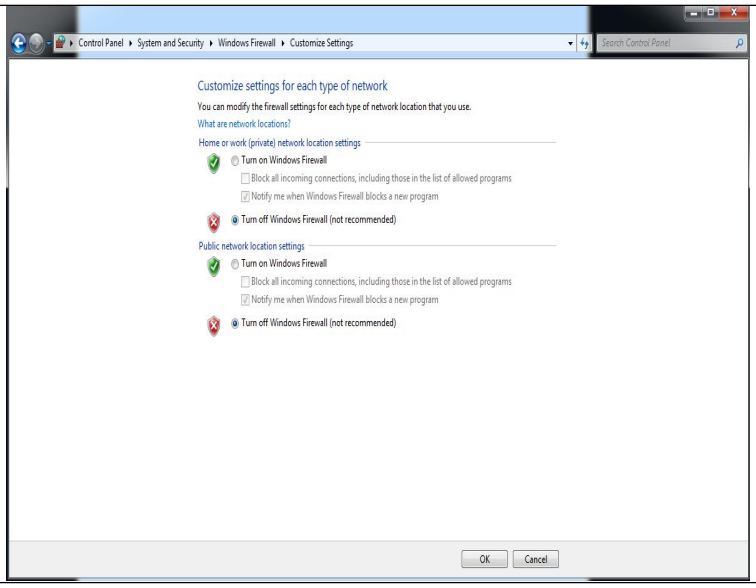
Acquire the image with all the calibration template (offset, gain & defect,) and save the image.	Refer to 7.6.2 and 7.6.3
Click “Load File” to Open the saved image.	
Find and write down the x and y coordinate position of defect pixel and the both ends coordinate position of defect line.	

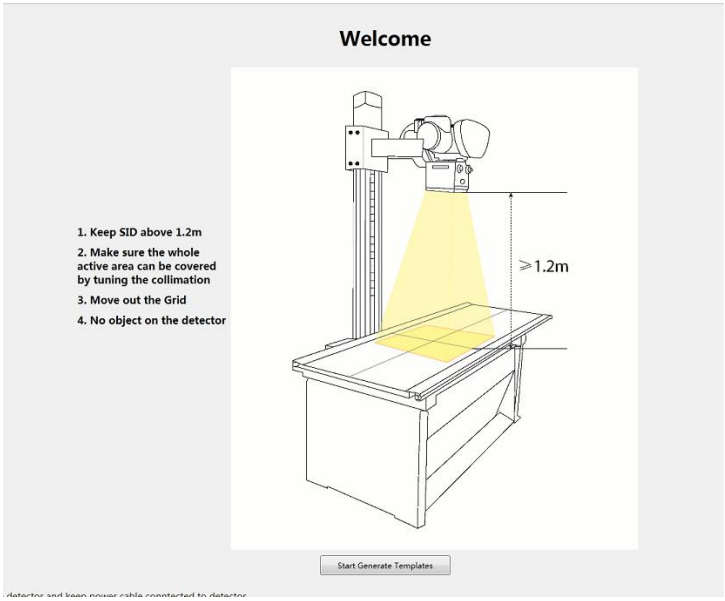
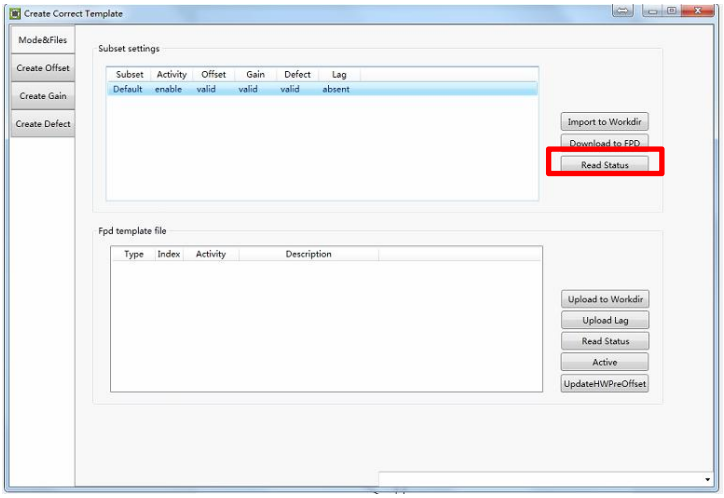
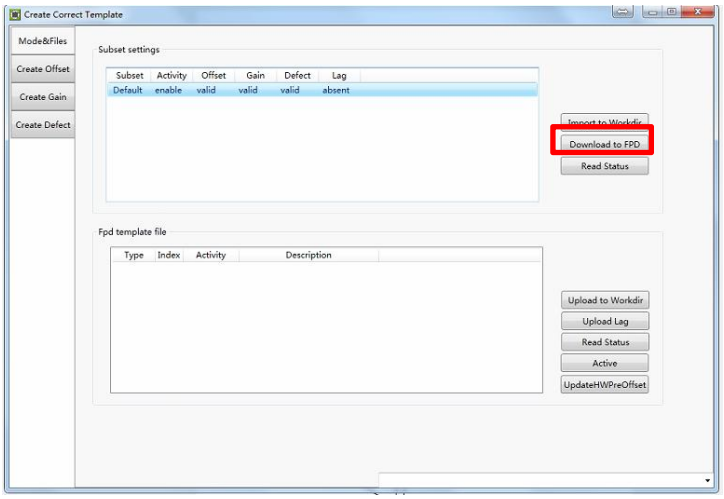
Enter “**Local File**” interface（#1）	
Click “**Load File**” button to set defect format and select the defect file（#2）	
Type in the coordinate position of defect pixels or defect line in to message box（#4&#6）	
Click “**Add**” button after type in (#5&#7)	
Click “**Delete**” button to delete the coordinate position from the defect map(#5&#7)	
Click “**Save”** to make the change valid (#8)	
Import the calibration template to FPD.	Refer to 7.6.5

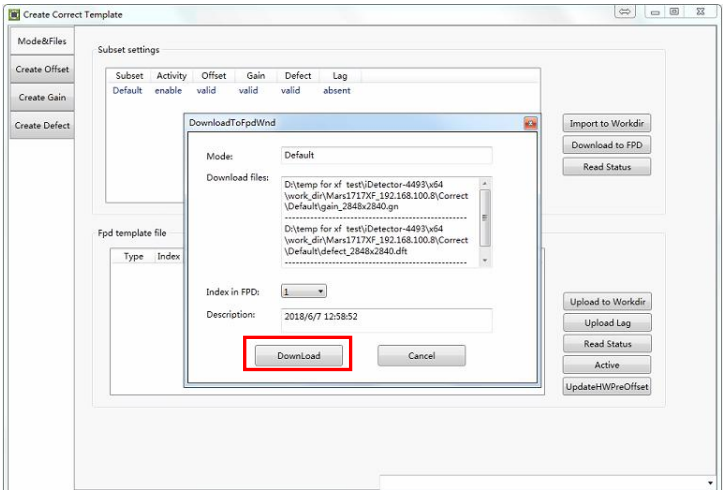
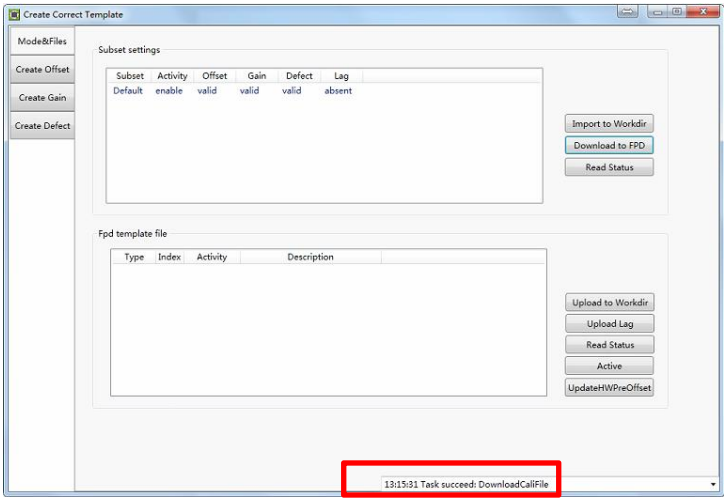
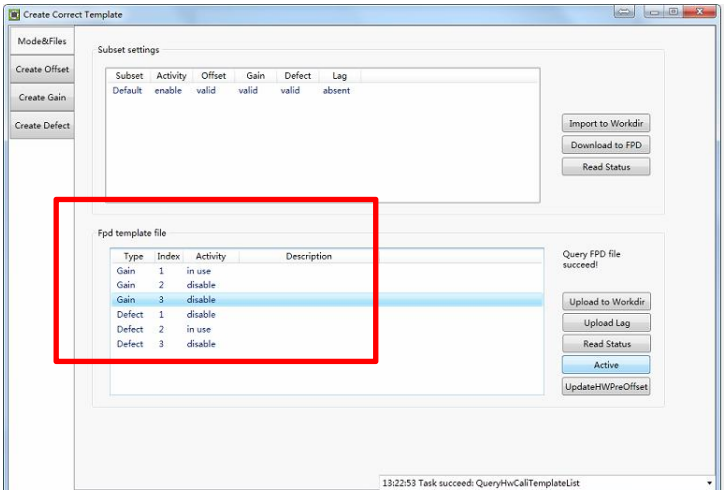
7.6.5 Import Calibration Template to FPD

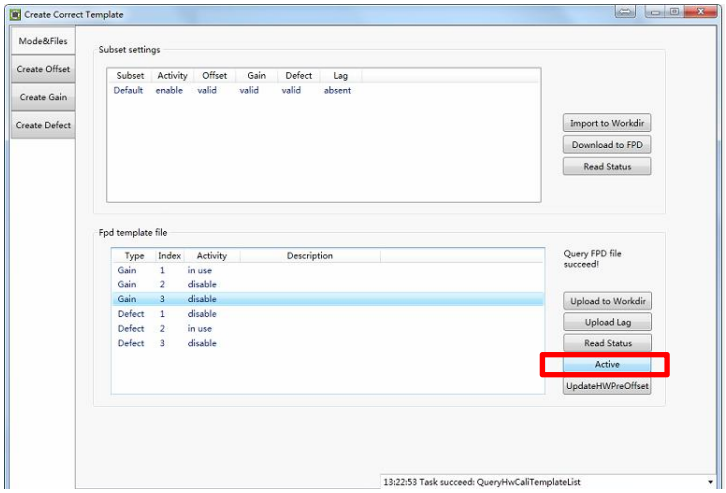
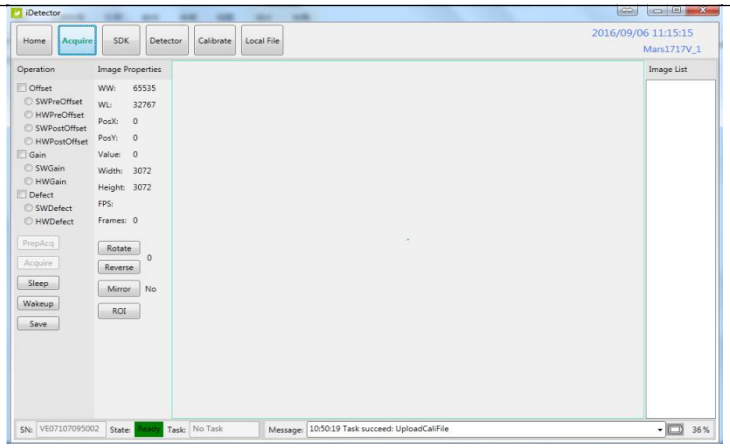
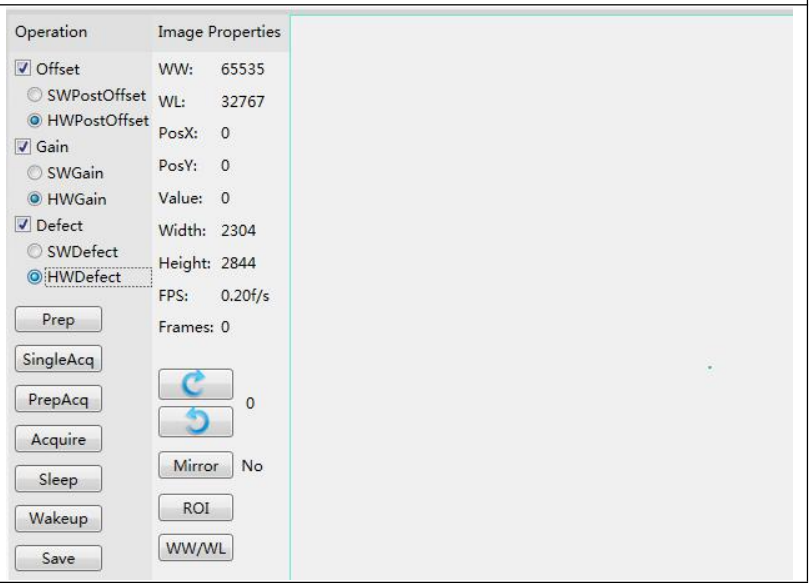
Note

- The generated calibration templates must transfer to detectors after Calibration is done.
- The calibration mode must set to hardware mode before connect the panel by DR Console.

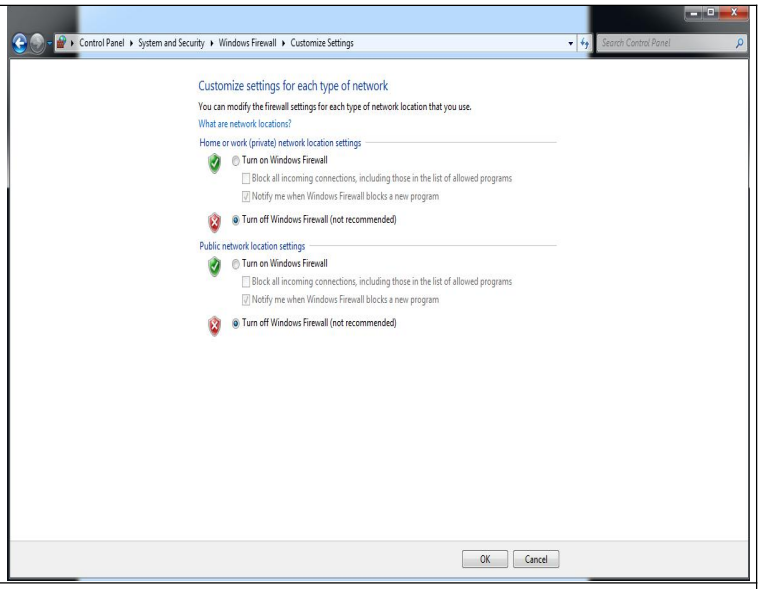
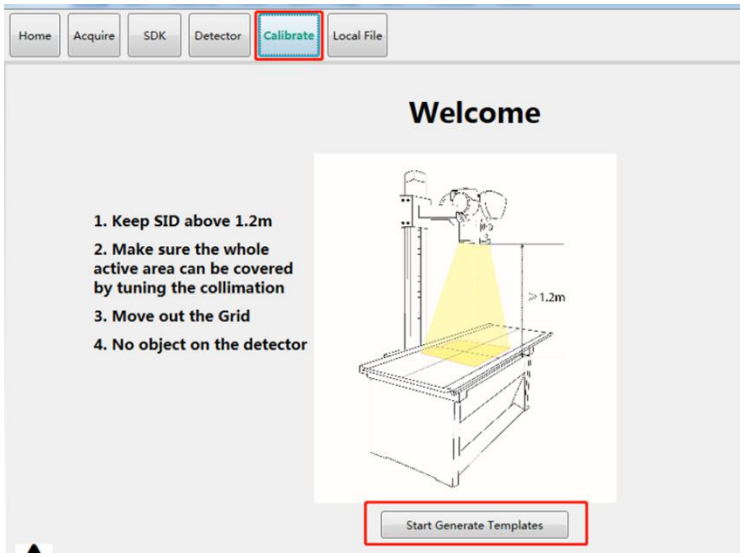
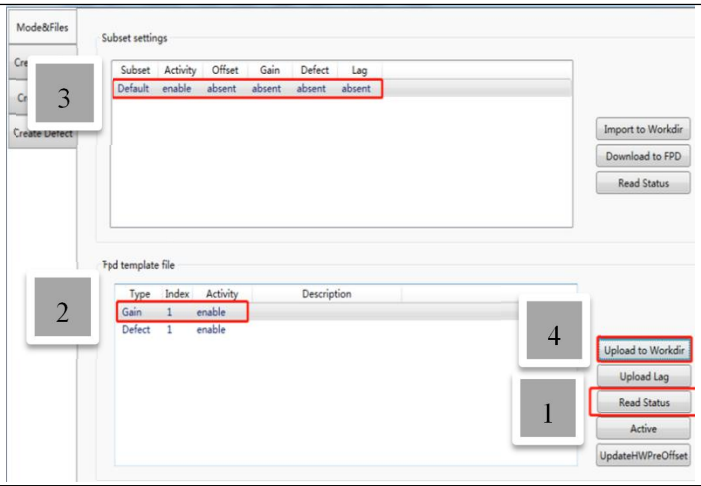
Make sure firewall is turned off	

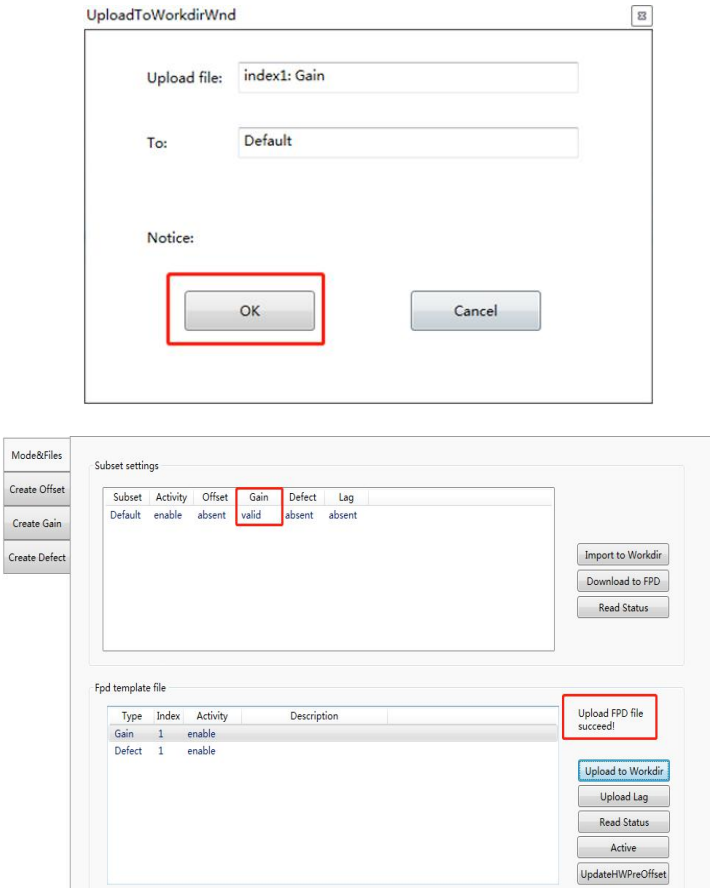
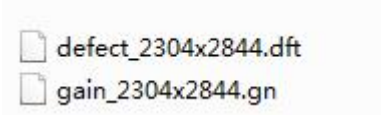
Choose “**Calibrate**” Click “**Start Generate Templates**”	
Click “**Read Status**” besides “Subset settings”	
Click the template to be downloaded Click “**Download to FPD**”	

Check information whether it is right. Change Index in FPD if necessary. Click “Download”.	
Wait until Bottom status filed shows “Task succeed: Download CaliFile”	
Click “**Read Status**” to read template status	

Choose template number according to requirements Click “**Active**” to activate template Close this interface	
Click “**Acquire**” Tab	
Select Offset Mode “HWPostOffset” Select Gain mode “HWGain” Select Defect mode “HWDefect” Now the calibration is set to hardware mode.	

7.6.6 Export FPD Calibration File

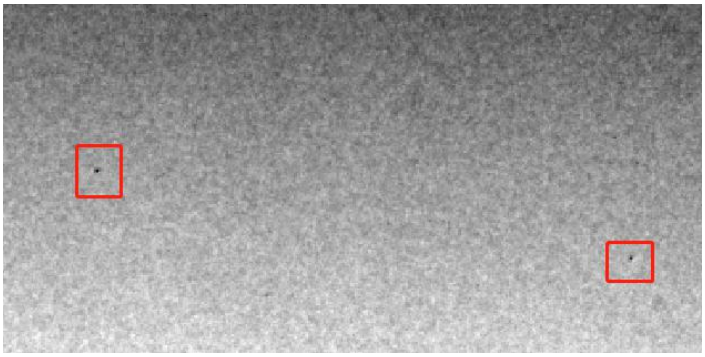
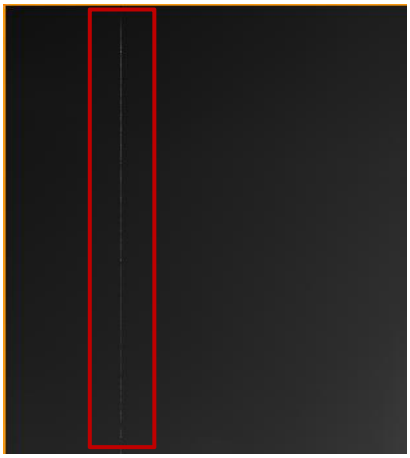
Make sure firewall is turned off.	
Connect the panel via iDetector and click "**Calibrate**" tab The calibration wizard will open into a new windows, Click "**Start Generate Templates**"	
Click the "**Mode&Files**" Tab. Click "**Read Status**" Button (-#1) to read the panel calibration file status. Select "**Gain**" under Type and "**Default**" under Subset.(#2&#3) Click "**Upload to Workdir**"(#4), new wizard will pop up.	

Click "**OK**"" till the "**Upload FPD file succeed"** showed up and the Gain calibration file is valid under the Gain	
Please export the Defect calibration file from the panel to computer with the same procedure.	\
Go to iDetector\x64\work_dir\Mars1417V3\ Correct\Default, where is the Gain and Defect template that export from the panel.	

7.7 Dead Pixel& Dead lines

Note

- Dead pixels or lines are on the image with all calibrations.

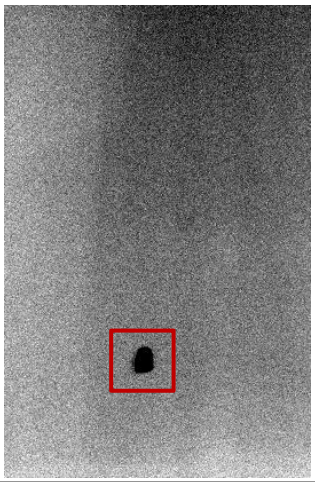
Dead Pixel	
Dead Lines	

Step	Action List	
1	Redo defect calibration, Import the Calibration files to detector.	
	Not work, jump to next step	Issue is resolved.
2	Add the coordinate of the defect line & defect pixel manually.	
	Not work, jump to next step	Issue is resolved. The defect points and lines is not marked out by iDetector.
3	Contact supplier and provide: ❑ Defect calibration file. ❑ Image with all calibrations. ❑ Exposure parameter of images, include kV, mA, ms, SID and gird specification **Refer to 8. Failure Information Collection**	

7.8 Black Dot

Note:

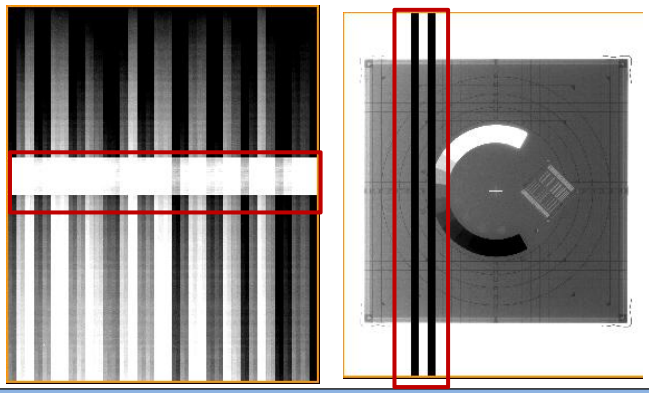
- Black dot is on the raw image without calibration.
- No object at the same position.
- The issue may cause by external factor.



Step	Action List	
1	Rotate 90 degree and acquire the bright image_ Compare the position of the dot with the faulted image.	
	In the same position, jump to next step.	In different position, clean the collimator or the filter of tube, and redo calibration.
2	Contact supplier and provide: ❑ Original Bright image **Refer to 8. Failure Information Collection**	

7.9 Dead Bar

The horizontal or vertical dead bar exists on the image.



Step	Action List	
1	Reboot FPD.	
	Not work, jump to next step.	Issue is resolved.

2	Contact supplier and provide: ❑ Original Dark Image and Original Bright Image **Refer to 8. Failure Information Collection**

7.10 Other Abnormal Image

Step	Action List
\	Contact supplier and provide the following information. ❑ Original Dark and Bright Image ❑ Full Processed Image with all the calibrations. ❑ Exposure parameter of images, include kV, mA, ms, SID and gird specification. ❑ Calibration files **Refer to 8. Failure Information Collection**

8 Failure Information Collection

- Original Dark Image
- Original Light Image
- Light Image with all calibrations.
- SDK Log
- FPD Log
- Calibration Template
- Exposure parameter of light image with all calibrations , include kV, mA, ms, SID and gird specification.

9 Operation Caution & Transportation Notification

9.1 Operation Caution

- Install the Vcredist before use any software tools.
- Please turn off power of the product and unplug power cord of adapter before cleaning.
- Use dedicated cables. Do not use any cables other than those supplied with the product.
- Never use methanol, benzene and acid because they would corrode the equipment. Please apply 70% Ethanol to clean the panel.
- Recycle the battery if the fully charged battery only last not more than 1 hour. Wasted batteries suggested return to manufacturer or put at appointed public battery reclaim area, do not mix battery with other waste or dispose of battery

9.2 Transportation Notification

9.2.1 Package Requirement

- Pack the FPD by original package with protection foam.
- Winding plastic thin film, such as PET, is necessary for damp proofing during transportation.

9.2.2 Battery Transportation

If battery is included in the package,

- Carriage by air is not available while transport cargo with lithium battery in China.
- Ask iRay service team to get the battery transportation certificate when return lithium battery from abroad.

1. General Information

	Date of Failure				
Product Type			**Software Version**		
Failure Part	☐Detector SN:	☐Battery charger SN:	☐Battery SN:	☐Cable SN:	☐Other Name: SN:
Type of Failure	☐Power Up Failure	☐Image Acquisition Failure	☐Connection Failure	☐Image Issue Failure Description:	☐Others Failure Description:
Failure Description					
Error occurrence	☐Permanent	☐Reproducible Preconditions:	☐Not reproducible Log file of SDK and panel when issue happened	☐Intermittent (Error frequency:) Log file of SDK and panel when Issue Happened	
Preconditions	☐Detector just power up	☐Detector warm up	☐After a certain time that the system was running(hours)	☐After move the part or cable	☐Others

2. Information of Image Issue

2.1 Image Data					
Name of Image	**KV&mAs**	**SID**	**Calibration Status**	**With/Without Grid Grid Specification**	**With/Without Image Enhancement**
			☐Hardware ☐Software ☐Offset ☐Gain ☐Defect		
			☐Hardware ☐Software ☐Offset ☐Gain ☐Defect		
			☐Hardware ☐Software ☐Offset ☐Gain ☐Defect		
			☐Hardware ☐Software ☐Offset ☐Gain ☐Defect		
2.2 Calibration Map					
Gain		**Defect**			