KETA *S*
Gel Imaging System

Instruction / Operation Manual

Version 1.0

<u>This instrument is intended for laboratory use only</u>

<u>Index</u>

A. Pre-installation

A-1. <u>Important Notice</u>

Before setting up and operating the instruments of KETA S gel imaging system, please carefully read these instructions to get familiarized with the installation and operation process. Instruction should be read by experienced individual before operating the instrument.

Any improper usage of the instruments may cause damage. Please refer to the safety notice included with this equipment.

The instruments shall not be modified or altered in any way. Any modification or alteration will void the warranty, void the regulatory certifications and create potential safety hazard. Wealtec is not responsible for any injury or damage caused by using the instruments for any non-intended purpose or injury as a result of modification of the instruments by any person who is not authorized by Wealtec Corp.

A-1-1. Warranty

KETA S gel imaging system is warranted to be free from defects in materials or workmanship for a period of one year from the original invoice date, under normal usage. Any defects occurring during warranty period, Wealtec Corp. will repair or replace defective products or parts without charge unless the defects arise from conditions outlined below. The defects described below are specially excluded from Wealtec warranty policy.

1. Improper operation of the instrument.
2. Repair or modification by any person who is not authorized by Wealtec Corp.
3. Damage caused by any (in)-direct accident, neglect or misuse.
4. Damage caused by disaster.
5. Damage caused by any improper solvents or samples

A-1-2. Technical and Service Contact

Most of the operation details are described in this instruction manual to assist and guide operator for an appropriate solution. For any other technical/ service questions, please contact your local representative or contact Wealtec international technical/ service specialist by E-mail: support@wealtec.com.

A-1-3. Safety Notice

Warning

★ UV transilluminator provides high ultraviolet radiation which can cause serious damage to unprotected eyes and skin. Before operating be sure all personnel in the area are properly protected.

KETA S gel imaging system uses UV illumination for sample visualization. Transilluminators and other ultraviolet equipment or lamps are powerful sources of ultraviolet radiation that can cause serious damage to unprotected eyes and skin. Always read the product manual before operating the unit.

Before operating any unit, be sure all personnel in the area are properly protected. Personnel should protect skin and eyes by wearing ultraviolet protection eyewear, gloves and clothing when operating the UV equipment.

When using a transilluminator, it is recommended that the transilluminator be installed and operated in a darkroom where access and exposure to UV is limited. Each transilluminator is shipped with an ultraviolet blocking cover. **Even though this cover blocks the UV radiation emitted by the unit, it is strongly recommended that the "UV Blocking Eyewear" should be worn as well.** For details in UV transilluminator operation, please refer to Wealtec UV transilluminator instructions.

A-1-4. CE Certification

⚠ It is not allowed to use a screwdriver to open the enclosures.

1. The product must be connected to the AC power supply mains through a three-conductor power cable, with the ground wire firmly connected to an electrical ground (safety ground) at the power outlet.
2. A certified power supply cord has to be used with this equipment. The relevant national installation and/or equipment regulations shall be considered. A certified power supply cord not lighter than ordinary polyvinyl chloride flexible cord according to IEC 60227 (designation H03 VV-F) shall be used. Alternatively, a flexible cord be of synthetic rubber according to IEC 60245 (designation H05 RR-F) shall be used. The power cord set shall have a power supply cord with conductors providing a cross-sectional area of 3G, 0.75mm^2 minimum.
3. The appliance coupler/inlet shall be easily accessible and readily disconnectable.
4. For ventilation purpose, suitable space shall be maintained.

A-1-5. Symbols

Symbol	Definition of symbol
$\sim$	Alternating input current
$\perp$	Only on built-in power supply for earth terminals
⏚	Protective conductor terminal
⚠	Caution of hazards
⚠	High temperature, do not touch
⚠	UV hazards

A-1-6. License

KETA S system was built under the Windows XP OS. The authorized product key for Windows XP OS was pasted on the board mount in the rear side of the KETA S system as in the following picture.

A-2. <u>Utilities</u>

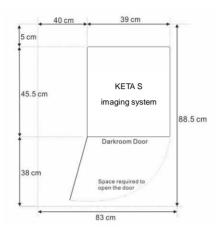## A-2-1. Operation Environment

1. KETA S gel imaging system can be applied for indoor used only.
2. System should be placed on top of the hard flat surface with enough space as in section A-2-3 requested for the system operation.
3. Operation temperature is from 0 to 40°C. Recommended operation temperature is around 25°C to have best performance of the imaging system.

A-2-2. Power Source

100~240 V grounded AC source can be applied for whole series of KETA imaging systems. Frequency of the power source from 50 to 60 Hz is applicable.

A-2-3. Space Requirement

A-2-4. Computer Requirement for Band Tool Software

1. Desktop computer
2. Intel® Core™ i3-3240 3.4GHz, 1 G RAM with English version Windows XP/VISTA/7 system or higher. If applied with Windows 8 OS, 32 bits is recommended to use rather than 64 bits due to the driver compatibility of the thermo printer.
3. USB (2.0) required.

* Intel® Core™ is a registered trademark of Intel Corp. Windows are trademarks of Microsoft, Inc.
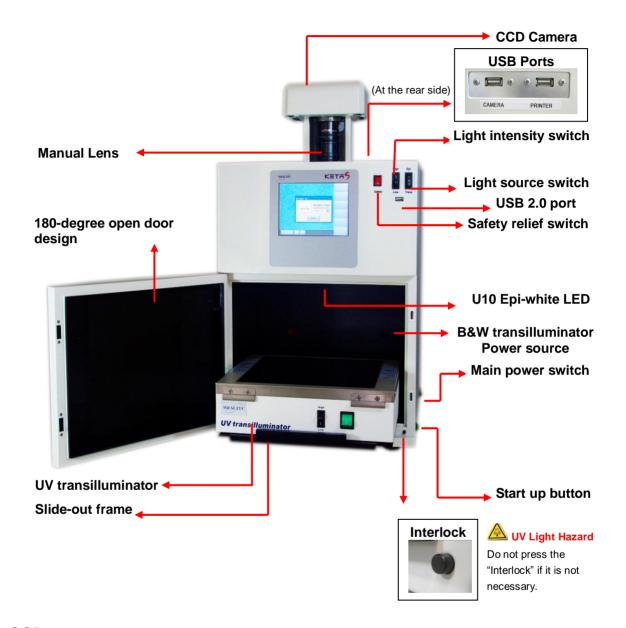
A-3. <u>Product Description</u>

KETA S is a standalone imaging system special for routine gel documentation purpose. Compact darkroom, large LED back light LCD display touch screen panel with in-build computer with USB 2.0 supported communication ports, KETA S needs no extra computer to capture image. Equipped with B/W 12 bits CCD camera and manual adjustment lens and operated through multi-language interface, KETA S provides the high quality but simplest way for operation. Epi-white LED as standard package and optional to upgrade with W/G/B/UV epi-illumination (Item#1155005). A large visual area (25 cm x 25 cm) with 302 nm high intensity low background MD-25K UV transilluminator is also a standard accessory. KETA S also equipped with built-in 24V power source especially for optional upgrade with BW-20 transilluminator (Item#1146021). Band Tool software is standard package for further image analysis in PC.

A-3-1. Specification

CCD depth	B/W 12 Bit
Chip size	1/2"
Pixel size (µm)	4.65 x 4.65
Pixel Resolution	1.4 Mega Pixels
Dynamic Range	3.6
Grayscale	4096
S/N Ratio (dB)	> 56
Lens	49 mm, f1.2, 8-48 mm 6X manual adjustment
Filter	Close-up 2X & HT-Amber filter
Communication	USB 2.0
Epi-illumination	White Light LED
UV Transilluminator	302 nm, 6 x 8 Walt tubes, 25 x 25 cm^2
DC 24V/ 0.67 A power source	For 20 x 20 cm BW-20 transilluminator
Filter Size (mm)	49
Control & display	6.5" Touch screen TFT LCD monitor
Image file format	JPG, BMP, JPEG, DFN, TIFF, PCX, GIF, TGA
Image storage	USB memory stick/ Build-in CF card
PC analysis software	Band Tool analysis software
Physical dimension (mm)	450 x 390 x 740 (W x D x H)
Power	230/120/100V, 50-60 Hz
Weight (kg)	38
Operation environment	Temp: 40°C, Humidity: 10~90% R.H. Non-condensing
Optional	
Thermal printer	Digital thermal printer
Convert plate	UV/White light converter plate
Software	Dolphin 1D analysis software
Transilluminator	20 x 20 cm BW-20 transilluminator
Illumination	Epi-W/R/G/B LED light; Epi-W/G/B/UV LED light

A-3-2. KETA S Hardware Overview

CCD Camera

USB Ports

(At the rear side)

CAMERA   PRINTER

Light intensity switch

Manual Lens

Light source switch

USB 2.0 port

180-degree open door design

Safety relief switch

U10 Epi-white LED

B&W transilluminator Power source

Main power switch

UV transilluminator

Slide-out frame

Start up button

Interlock

⚠ **UV Light Hazard**
Do not press the "Interlock" if it is not necessary.

CCD camera

12 bits B/W monochrome CCD camera for KETA imaging system is using *progressive CCD which communication via USB 2.0. It's featured with low dark current, high QE values, and excellent performance, which is ideal for bio imaging or molecular imaging.

Manual lens

KETA S equipped with focal F1.2, 8 - 48mm (6X) manual lens with C mount, 2X closed-up

and HT-Amber filter as standard.

Epi light source

Epi-white LED is the standard high intensity epi-illumination in the darkroom. Upgradable with MC 100 Epi-W/R/G/B / MC 100-1 multicolor W/G/B/UV can also be controlled through software interface.

Darkroom

Light-tight designed dark room allows all kinds of application in molecular imaging. UV radiation safety interlock switch as standard configuration keeps operators in safety working environment. 180° fully closed / opened door is convenient for gel cutting.

⚠ **Caution: Do not press the "Safety Interlock" while the door open.** If it is necessary, be sure all personnel in the area are properly protected. Personnel should protect skin and eyes by wearing ultraviolet protection eyewear, gloves and clothing when operating the UV equipment. Even personnel close to the KETA S system should be properly protected. Protection cover (Item#1146002) should be installed prior to apply for the gel excision application.

A-3-3. Band Tool Software Overview

Features	Descriptions
Automatic lane or band detection	Automatic detection capability, allows Band Tool software for gel data analysis.
User-friendly quick guide operation	The step-by-step quick guide function provides the user guidance from capturing image to fast image analysis. Ability to learn a complicated software operation is not necessary.
Compatible image files format	Various images file format JPG, BMP, JPEG, DFN, TIF, TIFF, PCX, GIF, and TGA is supported as can be loaded, analyzed and saved.
Short time (Within one minute) data analysis	Various options under "Analysis" function allows user to run the software automatically for various analysis and reports.
Traceable image enhancement function	While analyzing, Band Tool provides convenient tools such as text, line, color adjustment, rotation, flipping, invert etc. "Record" allows users to track previous action easily.

Ability to identify smiling gel accurately	Band Tool software provides "Node" function to identify bands in deformed smiling gel.
Image profile & 3-D display	Image data can be visualized in lane profile and 3-D display
Image blending function	Blending of image can have precise comparison between two different images
Support GLP/GMP mode	Image data can be protected by password log-in setting to avoid uncertain modification
Enhanced capturing methods	Specific design of Batch capture and DynaView function focus on chemiluminescence sample detection
Extremely low noise signal by darkroom calibration	Noise signal can be largely reduced through performing the darkroom calibration, and ensure to have clear background especially in chemiluminescence signal detection.

Minimum computer system requirement for Band Tool software

Intel® Core™ i3-3240 3.4GHz, 1 G RAM with English version Windows XP/VISTA/7 system or higher, USB (2.0) supported.
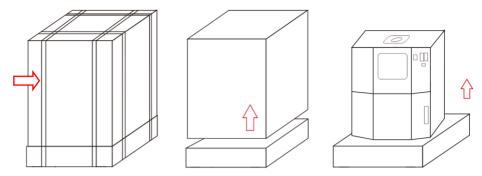
A-3-4. Printer (Optional)

Drivers of optional digital thermal printer, including Sony Up-D897 and Mitsubishi P95D, were pre-installed in the KETA S systems. An optional digital thermal printer, such as Sony UP-D897 and Mitsubishi P95D, is applicable in KETA S. Printer other than these two systems should be installed according to section B-3-2 prior to operate the system. Inject printer or other printers are all applicable in PC through Band Tool software.

B. Getting Start

Before operate with KETA imaging system, procedures below should be confirmed. Follow the setup instruction to set the system prior to operation.
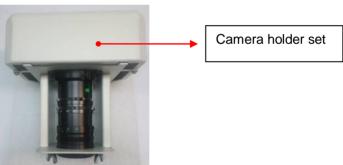
B-1. <u>Hardware Setup</u>

B-1-1. Unpacking

a. Cut off packing straps out of the package box

b. Vertically lift up the outer case.

c. Vertically lift up the darkroom from the bottom packing.

d. Carefully place the KETA S imaging system on top of the workbench. The workbench should provide the space as illustrated in section A-2-3.

B-1-2. Default Setting of Hardware

a. Camera installation

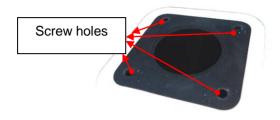1. **Take out the camera holder set.** The camera holder set is shipped separated from the darkroom.

Camera holder set

2. Remove four wing nuts and shielding rubber from the camera holder. Also remove lens cover from the lens.
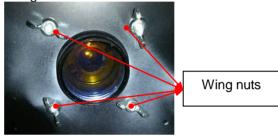

Wing nuts

Lens cover

3. **Mount Camera Holder:** Align the shielding rubber on top of the darkroom. Place and align the camera holder to the four screw holes on top of the darkroom unit.

Screw holes

Fasten the camera holder with wing nuts inside the darkroom.

Wing nuts

4. **Connect the camera with the darkroom unit:**

Take the USB connection cable. Plug-in USB B type connector to camera from the back of the camera holder, and connect the USB A type connector to the rear side of the darkroom.

CAMERA   PRINTER

5. **Install the lens hood in the front of the lens from inside the darkroom.**
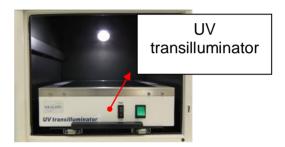

b. **Install UV Transilluminator:**
    1. Open the darkroom cabinet door and pull sliding frame out of the darkroom unit. Remove the tape from the UV transilluminator power cord.

Light intensity controlling cable with heat shrinkable tubing ← → UV transilluminator power cord

2. Position the UV transilluminator on the sliding frame of the darkroom with the UV transilluminator power switch facing the installer. Inside the darkroom unit, plug the UV transilluminator power cord to the UV transilluminator AC socket and light intensity controlling cable nearby at the rear side of the UV transilluminator.
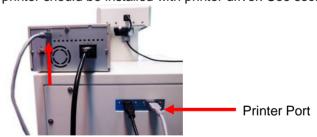
Note: It's highly recommended to use heat gun to tighten the heat shrinkable tubing at the connection site after installation to prevent the malfunction of the UV transilluminator.

UV transilluminator

c. Install Thermal Printer (Skip this step if printer is not purchased):

Connect the USB port on both thermal printer and darkroom unit. Apply with power cord for the thermal printer, and then the printer is ready for use. Printers other than Sony UP-D897 and Mitsubishi P-95D thermal printer should be installed with printer driver. See section B-3.

Printer Port

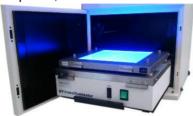### d. Apply of BW 20 blue and white light transilluminator in KETA S

(Skip following procedures if BW 20 is not purchased)

1. Remove the rubber plug located on the right below inside the darkroom.
2. Apply the power cable with two DC jack plugs onto the DC plug, and the other side to the BW 20.

3. Place the BW-20 on top of the UV transilluminator.
4. After the switch on the main power, BW-20 can be lit on.

5. BW-20 can be used with alternative power source.
   (a) Apply the BW-20 with 24V power adaptor.

   (b) Connect the power adaptor to the power cord for UV transilluminator.
   (c) Then the BW-20 power can be control through the front control panel as turning the light source switch to "Trans".

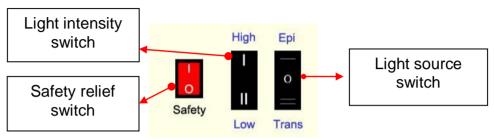**e. Setting Default Switching Positions:**
   1. UV Transilluminator:
   Ensure the UV transilluminator light intensity switch is switched to low and switch ON the UV transilluminator power (marked "I") as shown in the following picture.

Light intensity switch

Power switch

2. Front Panel Switches:

Ensure switches on the front panel are set with correct settings. The light source switch is switched at neutral (marked "O"), intensity switch is switched at "High" (marked "I"), and safety relief switch is switched to activated mode (marked as "O") as shown in the following picture.

Note: In the case where safety relief switch is switched to release mode (marked as " I "), the UV transilluminator will be turned on all the time whether the darkroom cabinet door is opened or closed. Make sure the safety relief switch is switched to activate mode all the time to protect user from UV radiation hazard.

3. Main Power Switch:

Ensure the main power switch located at the right backside of the darkroom is switched off (marked as "O") as shown in the following picture.

I   "ON"
O   "OFF"

B-1-3. Connections

Ensure the working voltage of the imaging system matches the local voltage. The AC socket is located at the rear side of darkroom unit and thermal printer (If printer is purchased). Connect power cable to the AC socket and plug it into main power source.

B-1-4. Power On

Turn on the main power switch and press on startup button once to initiate the system. If the system will not be used for more than 1 week, main power switch should be turned to "OFF". If the start up button keeps light on, the system is on. Touch screen will be turned off after idling for 10 minutes. Press on any spot on the touch screen to wake up the system. System

can be turned off by pressing on start up button after use.

	I "ON" O "OFF"	→	Start up

B-2. <u>Functional Check</u>

After power on the system, KETA S should be checked with following functions before getting start to make sure the system is installed correctly.

1. Place the fluorescent ruler inside the darkroom and on middle top of the UV transilluminator as observation sample.
2. Adjust the lens setting with Iris = 2, Zoom = 20, focus = 2.
3. Check with following functional switches:
   a. **Light source switch**: Turn the light source switch to "Epi" and then "Trans". Make sure both can observe the florescent ruler with different brightness.
   b. **Light intensity switch**: Turn the light source switch to "Trans" and turn the intensity switch to "Low" to check the observation of the fluorescent ruler will become darker after switching.
   c. **Safety relief switch**: Turn the light source switch to "Trans" and safety relief switch to " O ". Open the darkroom door slightly and make sure hear sound from the relay, and the UV light is turned off at the same time.
4. After the check, the system is ready for use.

B-3. <u>Software Installation</u>

B-3-1. Band Tool Installation

KETA S is a standalone system that needs no extra computer to capture the gel image. For further image analysis, standard package Band Tool software should be installed in the desk top computer.

B-3-1-1. Computer System Requirement
Intel® Core™ i3-3240 3.4GHz, 1 G RAM with English version Windows XP/VISTA/7 system or higher, USB (2.0) supported.
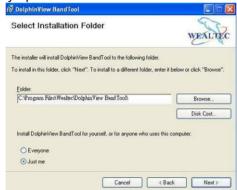
B-3-1-2. Installation Procedure
1. Insert the protection key to computer's USB port (USB key-pro).

14

2.   Insert software installation CD to the CD-driver. Click "setup" to initiate Band Tool analysis software setup wizard which will guide through the steps to install the software. Click "Next" to proceed.
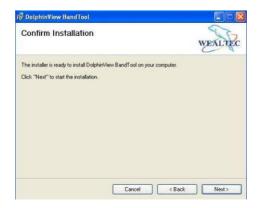

3.   Choose the software installation folder by clicking "browse" button and select the privacy option for single or multiple users. Click "Next" to proceed.
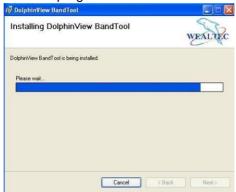
   Note: Default setting for folder "C:\Program Files\Wealtec\DolphinView BandTool\" and single user privacy option "Just me"
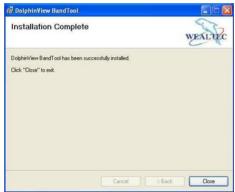

4.   Click "Next" to confirm and start the installation.

5. Installation of the software on the progress.

6. Band Tool analysis software setup completed successfully. Click "Close" to
   exit setup menu.

7. Reboot the computer to complete the system setup.

8. To initiate software program double click on the shortcut button ![DolphinView BandTool] from windows desktop or go to "Start Menu" → "Program file" → "Dolphin View Band Tool". Enter Band Tool serial Number printed on Key-pro or CD sleeve and click "Ok".

   Note: If key-pro is disconnected, a warning window will pop-up, click "OK" and ensure the
   key-pro connection before attempting to initiate the software.

B-3-2. Driver Installation of Thermal Printer

Printers other than Sony UP-D897 and Mitsubishi P-95D thermal printer should be installed with printer driver as following procedures.

1. Start up the KETA S system and wait until it get into KETA S software.
2. Apply the USB type keyboard to the USB printer port at the rear side of system.

3. Press on "Windows key" on the keyboard to back to Windows interface.
4. Press on "Ctrl"+ "Alt" + "Del" at the same time to initiate the "Task Manager".
5. Select the "KETA S.exe" and click on "End Task" to stop the KETA S program.
6. Copy the driver file from printer installation disk to USB memory stick.
7. Remove the camera cable from KETA S and plug in the USB memory stick instead.
8. Add new printer through "Windows Control Panel" -> "Printer and Faxes" -> "Add a printer".
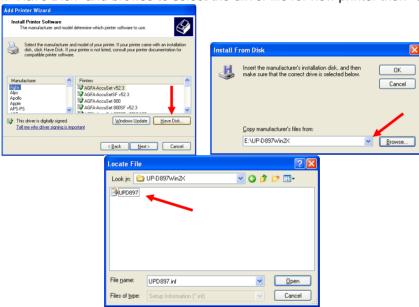
9. Click on "Next". Check on "Local Printer attached on this computer" and click on "Next".

10. Check on "Use the following port" and browse to choose "USB001", and then click on "Next" to proceed.

17

11. Click on "Have Disk" and browse to select the driver file for new printer then "OK".

12. Click on "Next" to install the driver.

13. If there already had driver installed, check on "Replace existing driver" to update. Then rename the printer if necessary.

14. Click on "Next" and "Finish" to finish the driver installation, and there will have new printer icon on the windows.

15. After the installation, remove the keyboard, mouse, and USB memory stick. Make sure to connect the camera and printer to the USB ports in the rear side of system.

16. After the system restarted, the new thermal printer is ready for used.

C. Operation

C-1. Hardware Operation

C-1-1. Image Capture:

1. Turn on KETA S main power switch (black switch located at right backside of darkroom) and press on start-up button to initiate the system.

2. Open the darkroom door and pull out the slide-out frame.

3. For trans-white light applications, operator shall apply the optional BW-20 transilluminator (Item# 1146021) on the UV transilluminator to have trans white light.

4. For trans-UV application, place and position the target sample on the surface of UV transilluminator. (Alt. on top of the B&W light transilluminator)

5. Push the slide-out frame back into the darkroom and close the door. Select and switch the light source switch appropriately to the preferred light source of Epi- or Trans-light. Additional fine-tuning of the sample target might be needed. This can be performed using either Epi-illumination with the darkroom door open or with UV-light (For operation, see below).

6. Adjust the lens assembly to the perfect iris, zoom and focal on the targeted sample image by viewing the image on the LCD display.

7. Touch the "Freeze" button on the LCD touch panel to capture primary image and to display the captured image on the LCD display. Integration time can be set with higher value to have brighter observation.

8. Upon capturing and printing the image, open the darkroom cabinet door and slide-out the UV-transilluminator to remove the sample.

9. Touched sample surfaces shall be cleaned with pre-moistened clean soft cloth after each use to avoid any possible contaminations and damage to the instrument.
10. Plug in with USB memory stick to save the image through USB port, or directly save the image into in-build memory.
11. Eject the USB drive with saved files from KETA S USB port and transfer to computer for further data analysis using Band Tool analysis software.

C-1-2. Gel Excision with Trans UV-light

⚠ **Caution:** Before opening the door under UV light excitation mode, make sure all personnel in the area are properly protected. Personnel should protect skin and eyes by wearing ultraviolet protection eyewear, gloves and clothing when operating the UV equipment. Even personnel close to the system should be properly protected. **It is strongly recommended to operate with optional UV protection cover installed in this application.**
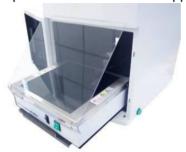
1. Turn on KETA S main power switch (black switch located at right backside of darkroom) and press on start-up button to initiate the system.
2. Open the darkroom door and pull out the slide-out frame.
3. Install the optional UV protection cover onto the UV transilluminator.
    a. Optional UV protection cover (Item#1146002) packed with one protection cover, two stainless steel hooks, and four screws.

    b. Loosen four screws on the UV transilluminator. Replace the screws and install two stainless steel support holder of the protection cover onto UV transilluminator.
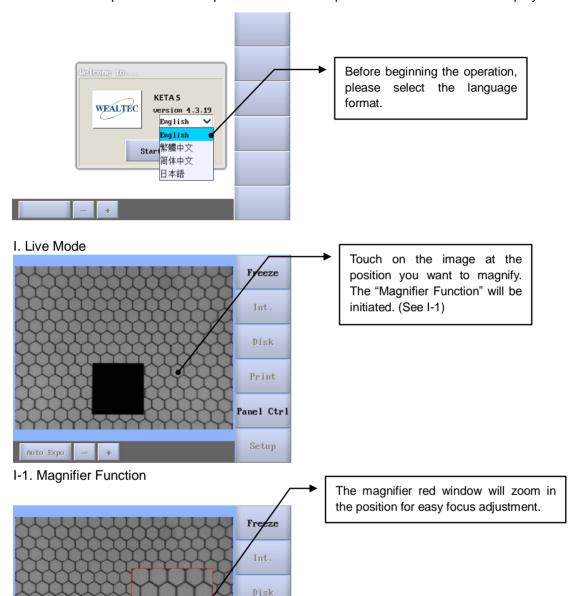
c. Insert the short side of the protection cover into the support holder as followed picture.

4.   Place and position the target gel on the surface of UV transilluminator.
5.   Switch the UV light intensity switch on the front panel to low intensity.
6.   Turn the safety relief switch to "release" mode (marked as " I ") to deactivate the cabinet door-open control safety interlock. In this mode, the trans-UV light will continue to be turned "ON" while door is opened during gel excision.
7.   Select the light source by switching the light source switch to "Trans" UV light. And turn the intensity switch to "LOW" position.
8.   Perform the gel excision as soon as possible.
   Note: Do not scratch the UV transilluminator filter during gel excision
9.   Turn off the light source and remove the UV protection cover.
10.   Push the slide-out frame back into darkroom and close the darkroom door.
11.   Turn the safety relief switch back to "activate" mode (marked as " O ") to activate the cabinet door-open control safety interlock and turn off the main power switch upon completing the sample excision.
12.   Touched sample surface shall be cleaned with pre-moistened clean soft cloth after every use to avoid any possible contaminations and damage to the instrument.

C-2. <u>KETA S Software Operation</u>

All the KETA S operations can be performed via touch panel associated with LCD display.

Before beginning the operation, please select the language format.

I. Live Mode

Touch on the image at the position you want to magnify. The "Magnifier Function" will be initiated. (See I-1)

I-1. Magnifier Function

The magnifier red window will zoom in the position for easy focus adjustment.

I-2. Panel Control

Live	Move icon to set Monitor's Contrast, Brightness and Gamma value.
Int.	Set to the default value.
Disk	Accept the new preset value and go back to "Main Menu". (See I)
Print	Go back to "Main Menu" without any changes in settings. (See I)

Brightness
Contrast
Gamma
Brightness ∨

Default   Ok   Cancel

Pan... ...trl

Auto Expo − +   Int. 40 ms

Setup

II. Main Menu

Live	Select "Live" back to "Live Mode". (See I)
Int.	Select "Int." for "Integration Time Setting" function. (See II-A)
Disk	Select "Disk" to see the "File List in Disk". (See II-B)
Print	Select "Print" to "Print Image" function. (See II-C)
Panel Ctrl	Select "Panel Ctrl" to adjust panel control. (See II-D)
Setup	Select "Setup" for "Setup Menu". (See II-F)

Auto Expo − +   Int. 40 ms

Select "Auto Expo" to auto capture the image (See II-E)

Integration Time to enter with "ms" as unit

II-A. Integration Time Setting

Integration Setup

Integration Time: 40

Default	1	2	3	INS
Cancel	4	5	6	Back	Del
Ok	7	8	9	Cls
	.	0	−	←	→

Touch numbers to input integration time count value.

Touch "Del" to delete letter to the right.

Go back to "Main Menu". (See II)

Touch "Cls" to clear all.

Touch "←" or "→" to move the cursor to left or right.

Set integration time as the default value.

Finish and go back to "Main Menu". (See II)

II-B. Disk File

Disk File

🗀 RECYCLER	OS Driver D ▾
🗀 System Volume Information	
🖼 003-M.tif	Save
🖼 003-W.tif	Load
🖼 09289381.dfn	Delete
🖼 120.tif	Copy
🖼 123.dfn	Paste
🖼 12345678.dfn	Exit
🖼 123654.tif	
🖼 12U-HT.tif	
🖼 12U-NR.tif	
🖼 12U.tif	

60%

Disk used space

Select the appropriate file.

Select the storage site, in-build memory or USB memory stick

Touch "Save" to save the captured file. (See II-B-2)

Touch "Load" to open the selected file. (See II-B-1)

Touch "Delete" to delete the selected file.

Touch "Copy" to copy the selected file (See II-B-3). Double click can multi select the file to copy.

Touch "Paste" to paste the selected file. (See II-B-3)

II-B-1 Image Viewer

File Size: 348479 Bytes
Image Size: 1360x1024
Depth: 8bit

Print
Panel
Setup

Close

Image info

Go back to "Main Menu". (See II)

Select "Print" to print image. (See II-B-1-1)

Select "Panel" to adjust panel control. (See II-B-1-2)

Select "Setup" to set printing parameter. (See II-B-1-3)

Touch "Close" to go back to "File List in Disk". (See II-B)

II-B-1-1 Print the Loaded Image

Protein 1-15.tif   11-26-2007 10:58:7

Print image with file name, date and time. Upon printing, program will automatically go back to "Image Viewer".

24

Move icon to adjust Monitor's Contrast, Brightness and Gamma value.

Run new preset value and go back to "Image Viewer". (See II-B-1)

Go back to "Image Viewer" without any changes in setting. (See II-B-1)

Set to default value.

II-B-1-3 Print Setup

Select setting parameter.

Check to print with "Real Size" of the image or "Full Screen" of the image (See II-D)

Check to print with adjustment image. Un-check to print with original image

Select "Cancel" to go back II-B-1.

Select "Ok" to confirm the setting

II-B-2 Save Menu

Select the file format to save.

Save image with default file name. (See II-B-2-1)

Save image with specified file name. (See II-B-2-2)

Touch "Cancel" to go back to "Disk File". (See II-B)

II-B-2-1 Auto Save

Save image with default file name. Upon saving, program will automatically go back to "Disk File". (See II-B)

II-B-2-2 Manual Save

File name display.

Touch icons to input file name. Ex. touch once on number 2, it shows 2; touch twice, it shows A; touch three times, it shows B; touch four times, it shows C.

Save file.

Go back to "Disk File" without saving the image. (See II-B)

II-B-3 Copy and Paste
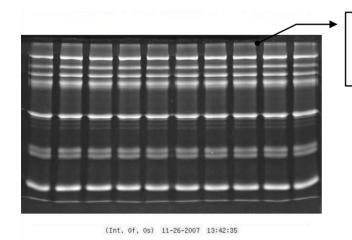
(3) Select storage pathway to transfer the file. File can only be transferred from built-in storage to USB.

(1) Files can be selected by single click, or double click for multi select. Click once again to undo the selection.

(2) Click on "Copy" to copy selected file

(4) As in the USB memory stick, "Paste" icon was activated. Click to paste the selected file into USB memory stick.
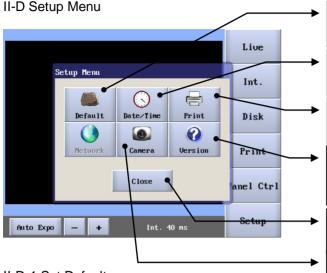
(5) After saving, system goes back to "File List in Disk". (See II-B)

II-C Print Image

(Int. 0f, 0s) 11-26-2007 13:42:35

Print image with integration frame count, date and time. Upon printing, program will automatically go back to "Main Menu". (See II)

II-D Setup Menu

	Select "Default" for parameter setting. (See II-D-1)
	Select "Date/Time" for time setting. (See II-D-2)
	Select "Print" for printing size option. (See II-D-3)
	Select "Version" to check current program version or to upgrade latest version. (See II-D-5)
	Touch "Close" to quit setup menu and go back to "Main Menu". (See II)
	Select "Camera" system calibration (See II-D-4)

II-D-1 Set Default

	Specify the parameters needed to be changed by touching into the corresponding text box
	Numerical or alphabetical input key. **Ex.** Touch once on number 2, it shows 2; Touch twice, it shows A; Touch three times, it shows B; Touch four times, it shows C.
	Back to "Setup Menu" without any changes. (See II-D)
	Touch "OK" to save new default value and back to "Setup Menu". (See II-D)

II-D-2 Set Date/Time
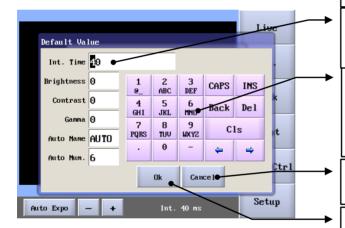
	Select the value to be changed by touching into the corresponding text box.
	Use the number keys to input new value.
	Back to "Setup Menu" without any changes. (See II-E)
	Touch "OK" to preset new time/ date and back to "Main Menu". (See II-E)
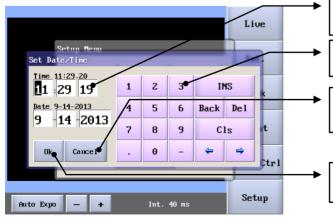
28

II-D-3 Print Setup

	Touch "Real Size" to select real size of the printing size. (See II-D-3-1)
	Touch "Full Screen" to select full screen printing size. (See II-D-3-2)
	Check to print with adjustment image. Un-check to print with original image
	Go back to "Setup Menu" without any changes. (See II-D)
	Touch "OK" to set new printing size and go back to "Setup Menu". (See II-D)
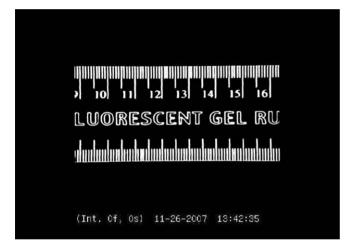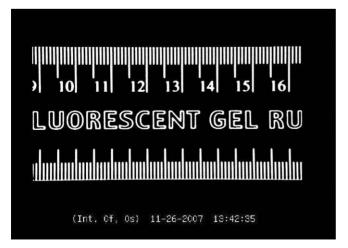
II-D-3-1 Print Real Size
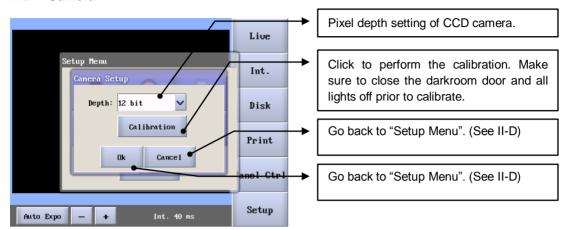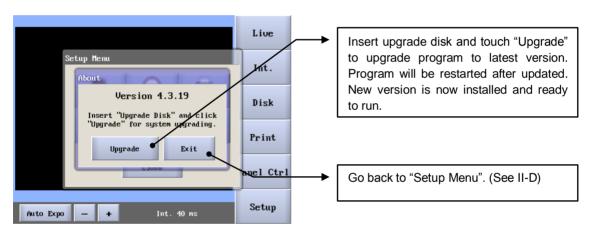
II-D-3-2 Print Full Screen

II-D-4 Camera

Pixel depth setting of CCD camera.

Click to perform the calibration. Make sure to close the darkroom door and all lights off prior to calibrate.

Go back to "Setup Menu". (See II-D)

Go back to "Setup Menu". (See II-D)

II-D-5 Version

Insert upgrade disk and touch "Upgrade" to upgrade program to latest version. Program will be restarted after updated. New version is now installed and ready to run.

Go back to "Setup Menu". (See II-D)

C-3. <u>Band Tool Analysis Software Operation</u>

C-3-1 Toolbar Introduction:

a. File

Open File	Ctrl+O
Image Explorer	
Open Demo Image	
✓ Quick Guide	
Record	
Infomation	Ctrl+I
GLP/GMP	
Save	Ctrl+S
Save As...	
Export Image	
Print Image	
Exit	

b. Edit

Undo
Redo
Reset
Gel Image
Colony Image
Microtiter Plate Image
Spot Image
Select ▸
Line ▸
Text ▸
Mask Tools

User	
Select All	Ctrl+A
Deselect	Ctrl+D

New
Edit
Delete

New
Edit
Delete

c. Image

Copy	Ctrl+C
Zoom All	▸
Zoom To	▸
Select Zoom	▸
Convert Depth	
Background Selection	
✓ Show Mask Image	
Interpolate	
Display Saturate	
Color Adjustment	
Filter	▸
Rotation	▸
Flip	▸
Background Subtraction	
3D Map	
Blending	

Auto
Horizontal
Vertical

Horizontal
Vertical

500%
200%
150%
100%
75%
50%
25%

Median
Maximum
Minimum
Average
PowerMean

Custom Rotation
90 Degree Right
90 Degree Left
180 Degree

Horizontal Flip
Vertical Flip

d. Tools — Options

e. Window

Tile Window
✓ 1 Raw Image -- (X = 132, Y = 0, Pixel = 190)

f. Language

✓ English
Chinese Traditional
Chinese Simplify
Japanese

g. Help

About

Icon introductions

 Image explorer:

Allow user to preview the image which captured from the KETA S or other imaging systems as in followed window. Double click on the file to open image in Band Tool software.

 Open image tool:

Allow user to open an image from hard disk, USB disk, CD-ROM etc.

 Save tool:

Allow user to save the file.

 Print image tool:

Click to print the image.

 Tile window tool:

Allow user to arrange multiple windows on same screen. User will be able to work on multiple windows simultaneously, switching between the windows is not needed.

 Quick guide tool:

Open a user-friendly tool window containing all the essential tools based on the type of analysis.

The quick guide tool window will be displayed on the right of user's working window.

![record icon] Record tool:

Keep tracks the 7 manipulations during the image modified. User can switch back to previous actions by double clicking on the "record" icon followed by double clicking in the "History Record" pop-up window. Record tool only tracks the previous actions where the original image data has been modified.

⇧ ⇩ Undo; Redo:

Allow users to trace back to previous motion or forward to the next motion which had made.

ABC Text tool:
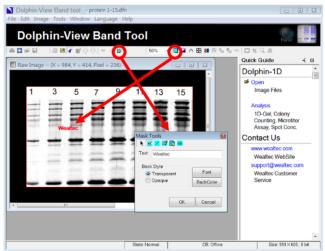
Allow user to add text on the image for annotation.
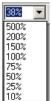
╱ Line tool:

Allow user to add line or arrows on image for annotation.

![mask icon] Mask tool

Allow user to add text, line on a mask with rubber and clean tool to edit. Assume a text "Wealtec" is labeled. While writing the text it will appear on the image and upon clicking "OK" button the "Show mask image tool" button will be selected automatically indicating showing the mask.

 Zoom tool:
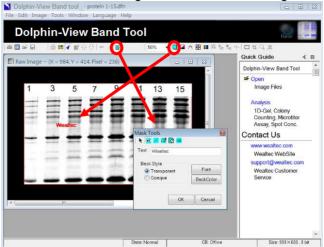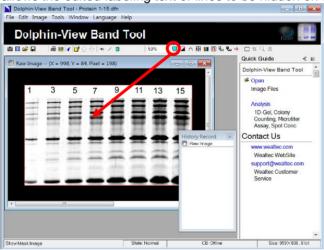
Allow user to select the view of the desired zooming size.

⊞ Show mask image tool:

Show or hide the edited text or lines mask on the image. Selecting or deselecting this tool allows user to see or hide the edited labeling text or lines on the Image.
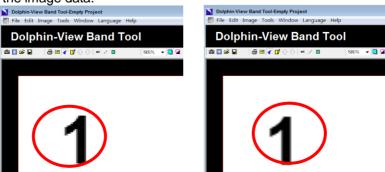
Deselecting this tool allows the edited labeling text or lines to be hidden on the Image.

⊞ Interpolate tool:

Smoothen the border of the image. This tool only changes the image outlook on the screen and will not change the image data.

a) Before interpolation   b) After interpolation

Display saturate pixel tool:
The saturated pixels will be displayed as a warning to advice user of potential inaccurate results.

Zoom all tool:
Magnify the whole image to fit the screen. User can choose to magnify the image horizontally or vertically.

Color adjustment tool:
Allow user to adjust the brightness, contrast, histogram and color of the image and the background. Clicking on the tool will pop up a dialog box. Choose from various parameters to adjust the color and sharpness of user's image.

Rotating tool:
Allow user to rotate, reorient or adjust the angle of the image. Click on rotation icon and choose from custom rotation, 90 Degree right, 90 Degree left or 180 Degree. By choosing "Custom Rotation" tool, a new dialog box will pop up where user can either enter the value of rotation or click on "grid" to rotate manually. It is disabled under GLP/GMP mode.

Flipping tool:
Allow user to turn the image by 180 degrees horizontally (flip horizontal tool) or by 180 degrees vertically (flip vertical tool). It is disabled under GLP/GMP mode.

Background subtraction tool:
Allow user to define a region on the image as a background and subtracts the defined background intensity from the entire image. This tool is especially useful in the case where the background intensity is evenly distributed. It is disabled under GLP/GMP mode.

Filter tool:
Allow user to obtain the optimized image by filtering the noise. It is disabled under GLP/GMP mode.

Select tool:
Allow user to define a region on the image for selected zooming and cropping. Click on select tool and drag the box to the region of interest.

Cropping tool:
Allow user to cut and preserve the selected region on the image. The unselected portion of the image is deleted. It is disabled under GLP/GMP mode.
(**Note**: In order to enable or use this tool select the region first with "Select" tool)

 Select zoom tool:

Magnify the selected image region. Click on Zoom tool and choose horizontally or vertically to magnify the selected region of the image.

(**Note**: In order to enable or use this tool select the region first with "Select" tool)
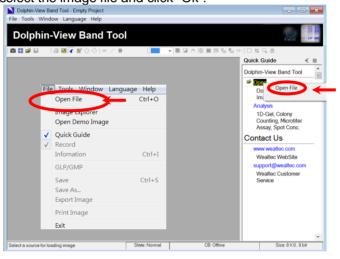
 3D Map tool:

This shows the 3D profile of the selected image region.

(**Note**: In order to enable or use this tool select the region first with "Select" tool)

C-3-2. Import Image

Click "Open" from quick guide and select "Open File" or click "Open" icon, or select "Open File" from file menu then select the image file and click "Ok".

C-3-3. Image Annotation:

Three options available to make annotation in Band Tool software: Text tool, line tool, and mask tool. The text made by text tool is movable and editable. It is like a sticker on the image, and allows the same size in different zooming. The line made by line tool is movable. The direction and length of line is editable. The mask tool is like drawing on the transparent drawing paper on the image. The text and line made by mask tool is fixed on the relative position of image. It is not movable and editable, but can be removed or erased with eraser.

C-3-3-1. Text tool
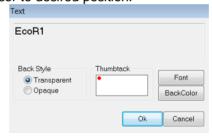
Note: The size of text tag will not change when you enlarge or shrink the view size of the image. The text tag can be moved, edited and deleted. It is also can be printed out along on the image.

1. Click "ABC" icon on tool bar

2. Use mouse pointer or cursor and click on the image. A text dialog box will pop up and Text Tag will appear on the image. Type the image title or the lane and band information in the Text Tag box.
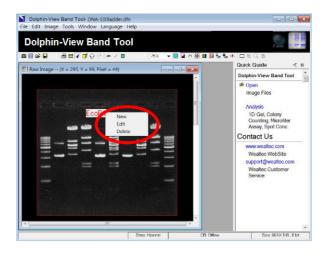
   Note: Adjust the position of text on the image by clicking and dragging the text with the mouse pointer or cursor to desired position.

3. Choose the background style of the text as "Opaque" to highlight the text on the image or "Transparent" for the text to simply appear transparently on the image.

4. To highlight the text, choose the background color by clicking on "BackColor" from Text dialog box.

5. Click on "Font" icon to adjust the font type, style, size, color and effects.

   Note: The thumbtack fixes a reference point for the text on the image. The text remains tagged at the same position on the image and font size remains the same, even if the image is enlarged or reduced in size.
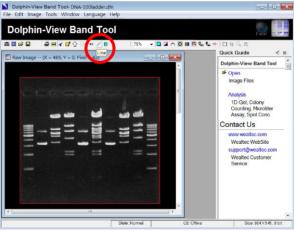
6. To edit the text, double click on the text on the image or right click and choose "Edit" or "Delete" to delete the text.

C-3-3-2. Line tool

Note: The size of text tag will not change when you enlarge or shrink the view size of the image. The text tag can be moved, edited and deleted. It is also can be printed out along on the image.
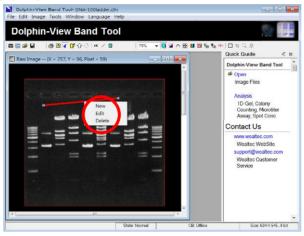
1. Click "line" icon on the tool bar

2. Drag the pointer on the image and draw a line. A line dialog box will appear as below.

3. Select the line style and the width from "Line Style" and "Line Width" pull down menu.

   Note: Adjust the position and angle of the line on the image by clicking on it and dragging the two end point of the line (square boxes at either end of the line) to desired position.

4. In order to use line, select "Don't Use" option on "Line Arrow" dialog box. To use an arrow, choose the type of the arrow from "Line Arrow" pull down menu.

5. Choose the line color from "Color" button in the line dialog box.

6. To edit the line, double click on the line on the image or right click and choose "Edit" or "Delete" to delete the line.
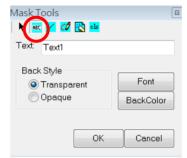
C-3-3-3. Adding mask

Mask Tools are the functional tools for text label, line label, pen signature, eraser and clear-all mask labels on the image. The size of text tag and line drawing on the image can be altered to the viewing side of image. They can not be moved and edited but can be removed by erasing with eraser. This option also allows the user to show or not to show mask while viewing or printing the image.

1. Adding text on mask:

   a.) Click "mask" icon on tool bar, mask tools window will pop up.

   b.) Click "ABC" icon on mask tool window.

   c.) Use mouse pointer or cursor and click on the image. A text dialog box will pop up and Text Tag will appear on the image. Type the image title or the lane and band information in the Text Tag box and click "OK" to enter the input.

Note: Adjust the position of text on the image by clicking and dragging the text with the mouse pointer or cursor to desired position before clicking "OK".

d.) Choose the background style of the text as "Opaque" to highlight the text on the image or "Transparent" for the text to simply appear transparently on the image.

e.) To highlight the text, choose the background color by clicking on "BackColor" from Text dialog box.

f.) Click on "Font" icon to alter the font type, style, size, color and effects.

2. Adding line on mask:
    a.) Click 🗒 "mask" icon on tool bar, mask tools window will pop up.
    b.) Click ∕ "line" icon on mask tool window and a line dialog box will pop up.

c.) Select the line width from "Line Width" pull down menu.
    d.) Choose the line color from "Color" button.
    e.) Drag the mouse pointer or the cursor on the image to draw a line.

3. Drawing on mask:
    a.) Click 🗒 "mask" icon on tool bar, mask tools window will pop up.
    b.) Click ✐ "pen" icon on mask tool window and a pen dialog box will pop up.

c.) Select the pen width from "Pen Width" pull down menu.
    d.) Choose the pen color from "Color" button.
    e.) Drag the mouse pointer or the cursor on the image to draw the irregular line.

40

4. Erase image (text, line, drawing) on mask

    a.) Click ![mask icon] "mask" icon on tool bar, mask tools window will pop up.

    b.) Click ![eraser icon] "eraser" icon on mask tool window and an eraser dialog box will pop up.

    c.) Select the eraser size from "Rubber Size" pull down menu.
    d.) Drag the mouse pointer or cursor on the image to erase the image on the mask.

5. Clear mask image

    a.) Click ![mask icon] "mask" icon on tool bar, mask tools window will pop up.

    b.) Click ![cls icon] "cls" icon on mask tool window and a dialog window will pop up.

    c.) Click "Yes" to clear mask image or click "No" to leave the dialog window.
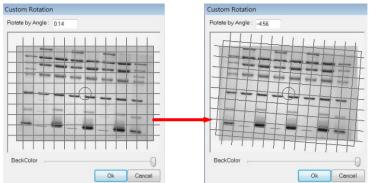
C-3-4. Image Modification

Previous actions or history record can be viewed by clicking ![Record icon] "Record" on tool bar followed by double clicking on "History Record" pop-up window. Image data will be permanently changed upon saving the file. The functions in this section are disabled under GLP/GMP mode.
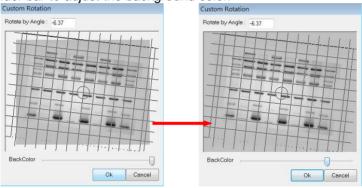
C-3-4-1. Rotating

1. Click ![Rotating icon] "Rotating" icon on tool bar.
2. Select "90 Degree Right", "90 Degree Left", or "180 Degree" to rotate as required, or select "Custom Rotation" for any other desired rotate angle.
    a.) Adjust angle of image with input angle value or rotate the grill.

b.) Drag the slider bar to adjust the background color.
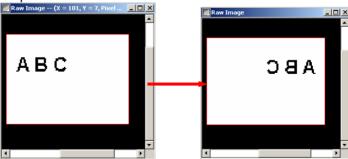
c.) Click "Ok" to rotate the image.
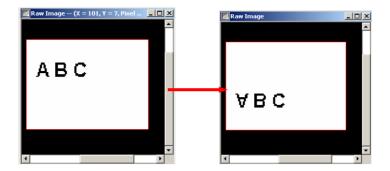
C-3-4-2. Flipping

1. Click "Flipping" icon on tool bar.
2. Select "Horizontal Flip" or "Vertical Flip" to flip the image.
   a.) Horizontal flip
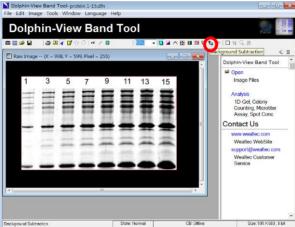
   b.) Vertical flip
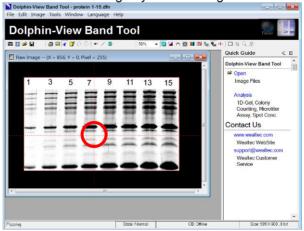
C-3-4-3. Background subtraction

1. Click 🔲 "Background Subtraction" icon on tool bar.
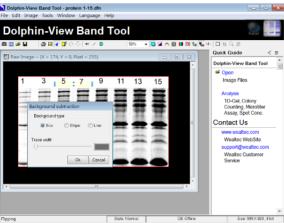
2. Move cursor to draw a line on the image by click holding the left mouse on the image.

3. "Background subtraction" window will pop up. Select gel's background type and trace width by selecting "Box", "Stripe" or "Line". Then click "Ok" to proceed.

   a. Box: This function is applied to evenly distribute background intensity. It subtracts the selected area's background intensity from the whole image.

43
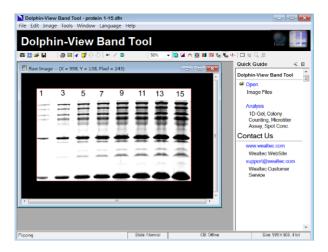
b. Stripe: This function is used for an uneven background from left to the right. Mark the background area from left to the right and drag the slider bar to adjust "Trace width".

c. Line: This function is applied for an uneven background from top to the bottom. Mark the background area from the top to the bottom and drag the slider bar to adjust "Trace width".

4. Auto-background selection window will pop up. Select the background type and click "Ok" to proceed.

5. The resulting background subtracted image.
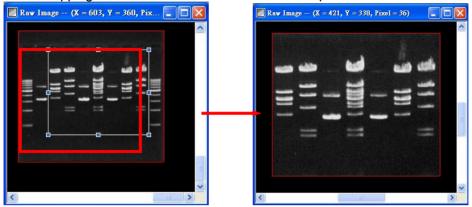
C-3-4-4. Filter

1. Click ⚡ "Filter" icon on tool bar.

2. Select "Median", "Maximum", "Minimum", "Average" or "PowerMean" to remove noises from the image.

   a.) Median: This filter preserves more of the edges and contour of the main object in the image while getting rid of even more of the very sharp peripheral noise. It is particularly useful to reduce speckle, salt and pepper noise. Reduces noise in the active image by replacing each pixel with the median of the neighboring pixel values.

   b.) Maximum: This filter makes the lighter pixels larger and shrinks the darker ones. This filter does grayscale dilation by replacing each pixel in the image with the largest pixel value in that pixel's neighborhood.

   c.) Minimum: This filter makes the lighter pixels smaller and the darker ones larger. This filter does grayscale erosion by replacing each pixel in the image with the smallest pixel value in that pixel's neighborhood.

   d.) Average: This filter will smooth out sharp transitions (High frequencies), so it can get rid of sharp noise, but will also get rid of sharp aspects in the image that you may want to keep. This filter can be used for smoothing of noise in images. It also blurs edges, displaces boundaries and reduces contrast.

   e.) Power Mean: This filter is useful for suppressing salt and Gaussian noise within an image (It worsens the effect of pepper noise). It replaces the value of the pixel being processed with the power mean of the pixel values within the filtering window.
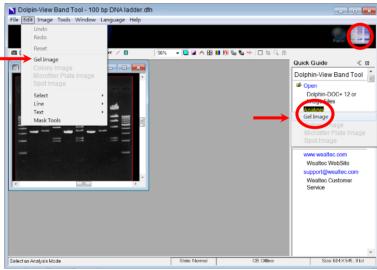
C-3-4-5. Cropping

1. Click ☐ "Select" icon on tool bar to define the desired region on the image.
2. Click ✄ "Cropping" icon on tool bar to delete unselected portion.

C-3-5. Gel Image Analysis
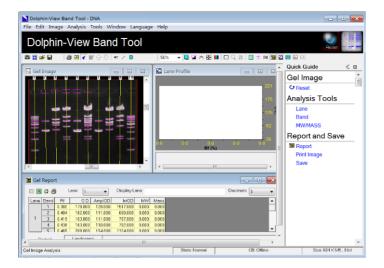
Band Tool software allows user to analyze the gels images. DNA and Protein gel image is taken as a reference in the following examples for tool description. Click "Analysis" from quick guide and select "Gel Image" or click "Gel" icon, or select "Gel Image" from edit menu to open gel analysis function.

1. Select the appropriate background and click "Ok" button to proceed.
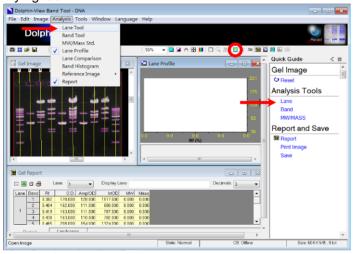
2. The program will define automatically the gel image, lane profile and gel report.
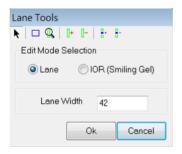
C-3-5-1. Lane analysis

Click "Lane" from quick guide or "Lane Tool" icon, or select and click "Lane Tool" from analysis menu for lane identifying tool.

Lane tools

 Arrow tool:

Allows user to select the lane of the interest and adjust the lane width and lane angle. The lane frame can also be adjusted to define the region of interest

▢ Define region / Region of interest (ROI) tool:

Allows user to draw a lane frame to define an area of interest on the image. Only one region of interest can be defined at a time.

🔍 Lane finder tool:

Allows user to detect lane(s) automatically by Band Tool software within the defined region of interest

⌷⁺ Add lane tool:

Allows user to add lane manually within the defined region of interest.

⌷⁻ Delete lane tool:

Allows user to delete a lane manually within the defined region of interest.

⁚⁺ Add node tool:

Allows user to add nodes at various positions along the lane. These nodal points can be used to adjust the lane borders to fit the curved or skewed lane. In "IOR (Smiling Gel)" mode, these nodal points can be used to define the analysis area of smiling gel.

⁚⁻ Delete node tool:

Allows user to delete the unwanted nodes.

Lane Width │42│ Lane width:

Allows user to adjust the lane width by typing the desired number in the lane width dialog box on the lane tools menu. The minimum value that can be assigned for the lane width is 2.

Note: The lane width value applies to all the lanes that are defined in the image. Individual lanes cannot be assigned with different lane width values.

Defining lanes

    a). Blue border and individual lanes denote the lane frame by green columns. Clicking on the lane of the interest, will highlight them by a red column.

    b). User can adjust the lane frame represented by an anchor point at each corner of the image by holding and dragging the anchor point with the mouse pointer. All the

individual lanes attached to lane frame will also move accordingly.

Note: User can select the "ROI" tool to draw the new area of interest on the image referred to as lane frame. User then can use the "Lane Finder" tool or "Add Lane" tool to define lanes in the region of interest.
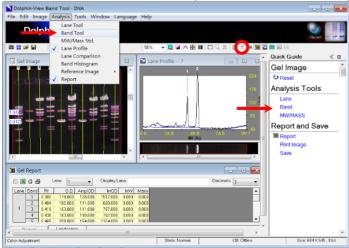
c). Three anchor points at the upper and lower border mark each lane. Holding and dragging the middle anchor point allows adjusting the position and angle of each lane.

d). To adjust for the skew of the gel and lanes, select "Add Node" from the "Lane Tools" dialog box and click on the lane at the skewed region. Then use the "Arrow Pointer" tool at the upper left corner of "Lane Tools" dialog box to drag and adjust the lane to fit the skewed region.

e). To adjust the smiling gel, select "IOR (Smiling Gel)" mode from "Edit Mode Selection" in "Lane Tools" dialog box. Select "Add Node" and click on the gel board at the skewed region. Use the "Arrow Pointer" tool at the upper left corner of "Lane Tools" dialog box to drag and adjust the gel board to fit the skewed region.

f). Click "Ok" upon finishing the lane definition.

C-3-5-2. Bands analysis

Band Tool software automatically identifies all the bands on the gel image. User may further edit the bands on the image by using the band tool menu. Click "Band" from quick guide or "Band Tool" icon, or select and click "Band Tool" from analysis menu for band identifying tool.

Band tools

![arrow icon] Arrow tool:

Click the arrow tool to select and analyze the band of the interest.

![band finder icon] Band finder tool:
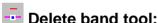
Allow user to detect bands automatically on the lane(s). Click on Band finder button and two options will be available. Choose the "Selected Lane" command to detect bands only in the selected lane or choose "All" command to detect bands in all the lanes within the region of interest.

![move band icon] Move band tool:

Click move band tool to adjust or relocate the band along the lane.

![add band icon] Add band tool:

Allow user to add band which is not detected by Band Tool software.

![delete band icon] Delete band tool:
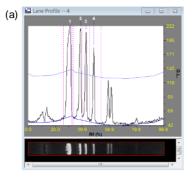
Click delete band tool to delete the bands that could be artifacts.
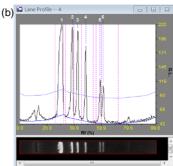
Band height and smooth factor

Band Tool software automatically detects all the bands on your image. Band height and smooth factor function allows user to define the sensitivity of the band detection.

![Band Height icon] Band Height:

Increasing the band height would reduce the sensitivity of detection. This is particularly useful when the bands are strong and well defined. Decreasing the band height increases the sensitivity of detection. This is particularly useful when the bands are fading. Band height represents the detectable peak height of the band in lane profile window. As shown in the figure (a), the upper line across the peaks. Fading bands represented by two small peaks are under the detectable range. The line passing under the peaks represents the background noise. Decreasing the band height value increases the sensitivity of the detection. As shown in the figure (b), below the upper line is passing across the small peaks. Now the fading bands are also detected by Band Tool software.

(a) (b)

Smooth Factor **Smooth Factor:**

Smooth factor's function is a "noise filter for band profile" and the value of smooth factor is a "parameter for filter's sensitive". Existing default value is sufficient for normal operation, but the adjustable option is kept for special requirements.

Overlap correction

Overlap correction is applying the Gauss-Mode operation mode to calculate the adjacent bands.
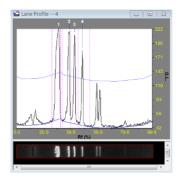
Defining bands

a). Choose the "Arrow Pointer" tool from the band tools menu and select a lane on the image. The bands in each lane are sequentially numbered from top to bottom. Further additions of bands in the same lane at any position are given subsequent numbers.

b). Move the sliding bar corresponding to the band height function and adjust the sensitivity of band detection. Choose the band height parameter that best detects all the bands on the image.

c). Click on "Add Band" button to add bands that are not detected by band finder after adjusting the band height parameter.

d). Click on "Delete Band" button to delete bands that you determine as artifacts.

e). Choose the "Move Band" tool to adjust the position of band marker.

Each band is marked with a line passing through the band and a square box located at the center of the line. To adjust the band marker position, select the "Move Band" function tool and click on the square box located on the band. Then drag the box to adjust the position of band marker.

Note: Band marker indicates the mobility of the band.
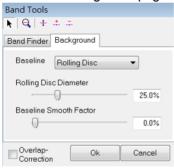
To predict the molecular weights of the bands more accurately, user can position the band marker to correspond exactly to band profile peak. Select the lane in which user wants to make band marker adjustments. Then click on 🖾 "Lane Profile" icon on the toolbar. A lane profile window will pop up displaying the profile of each band in the lane. Three lines mark each band profile. One line on either side of profile, mark the base of

51

peak and the center -line marks the profile peak. Select the "Move Band" tool from the band tools menu and drag the band marker till it corresponds to center or tip of the profile peak.
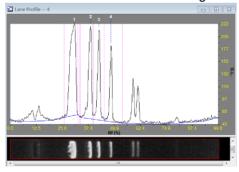

Baseline settings

Band Tool software allows user to edit different background parameters to best subtract the background noise from the image. Click the background page in the "Band Tools" dialog box.

Background baseline

The background baseline is represented by a blue line running at the base of peaks in the lane profile window. Allows user to choose different baseline settings from the baseline dialog box:
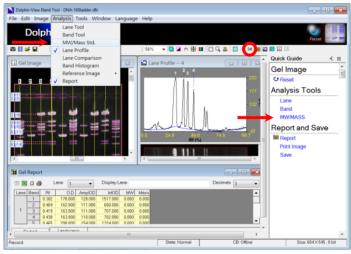
a.) Rolling Disc: Rolling disc function chooses the optimal background baseline for the image automatically.

b.) Min: The minimum function chooses the lowest peak baseline as the background.

c.) Zero: The zero function doesn't set any baseline for the background.

Note: If the user made any changes on the default background settings, ensure to check the "Overlap-Correction" as the Gauss-Modeling dialog box will pop up and if it is checked then click "Auto Fit" in Gauss-Modeling dialog box for the changes to take effect.

C-3-5-3. MW / Mass analysis

After the lanes, bands and the optimal background parameter for the image have been defined, user can use the MW/Mass tools to analyze the image. Click "MW/MASS" from quick guide or "MW/MASS Std." icon, or select and click "MW/MASS Std." from analysis menu for molecular weight and mass calculation tool.

MW tools
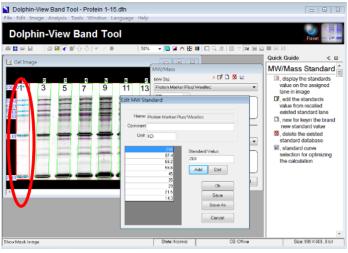
▦ Display value on image tool:
Allow user to display the molecular weight standards data of bands on the image. Choose a molecular weight standard from the MW Std. pull down menu and click on a lane or multiple lanes on the image. The software automatically assigns the molecular weight standards to the bands in the lane and displays them on image.

📝 Edit tool:

Click edit tool to edit any current saved molecular weight standard data. Select or deselect the standard lane on the image by clicking mouse on the lane. More than one standard lane can be selected. By pointing the cursor on the blue node, clicking the mouse on the band allows user to select or deselect the standard band as the rest of the bands will renew the ranking of standards.

New tool:

Allow user to create and add new molecular weight standard data if the loaded standard on the image does not exist from the standard list. Click "New" tool for MW Std. in the dialog box.

    i.   Input new standard name and click "OK".

    ii.   Input standard's value and click "Add" to add the value to the left list.
    iii.   To delete wrong value, select from the left list and click "Del".
    iv.   Click "Save" and "Ok" to go back to "MW/MASS" window

Note: Name: Give a "name" to a molecular weight standard.

Comment: Specific comment or note for this molecular weight standard.
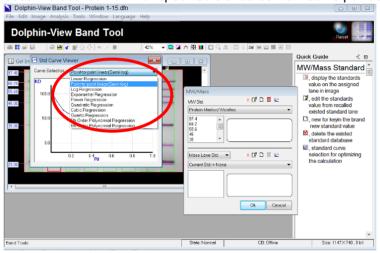
Unit: Unit of the standard value, ex. DNA use "bp", protein use "KDa" and etc.

Add/Del: Add or delete a standard value into or from new molecular weight standard list.
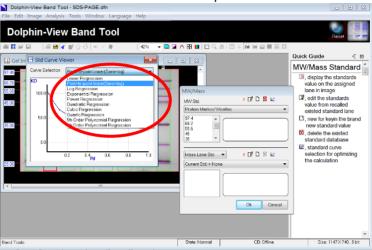
✖ Delete tool:
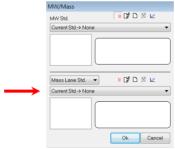
Click to delete molecular weight standard from the list.

📈 Standard curve tool:

The Standard curve tool is applied to select the best curve fit for the standards curve on the image. Select the molecular weight standards lane on the image then click on the standard curve button. Choose the best curve fit for specified standards from curve pull down menu.

Mass tools
(i) Mass lane standard

🔢 Display value on image tool:

Click to display the mass standards data of bands on the image.

📝 Edit tool:

Click edit tool to edit any current saved molecular weight standard data. Select or deselect the standard lane on the image by clicking mouse on the lane. More than one standard lane can be

selected. By pointing the cursor on the blue node, clicking the mouse on the band allows user to select or deselect the standard band as the rest of the bands will renew the ranking of standards.

New tool:

Allows user to create and add new mass standard data if the loaded standard on the image does not exist from the standard list. Click "New" tool for Mass Lane Std in the dialog box.

      i.   Input new standard name and click "OK".

    ii.   Input standard's value and click "Add" to add the value to the left list.

   iii.   To delete wrong value, select from the left list and click "Del".

   iv.   Click "Save" and "Ok" to go back to "MW/MASS" window.

     Note: Name: Give a "name" to a mass standard.

            Comment: Specific comment or note for this mass standard.

            Unit: Unit of the standard value, ex. DNA use "bp", protein use "KDa" and etc.

            Add/Del: Add or delete a standard value into or from new mass standard list.

            Ins: Insert a new standard value into the new mass standard list.

☒ Delete tool:

Click to delete mass standard from the list.

ᓫ Standard curve tool:

Allow user to select the best curve fit for the mass standards on the image. Select the mass standards lane on the image and then click on the standard curve button. Choose the best curve fit for specified standards from curve selection pull down menu.

(ii) Mass band standard

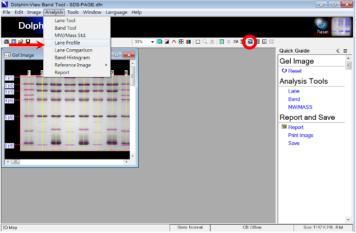Select and click the "Mass Band Std." from mass standard pull down menu

i.   Select by clicking the Mass bands standard on the image, input and update the mass value individually in the Mass Band window. Use left click mouse to select and right click mouse to deselect the Mass bands.

ii.   Input the caption, unit and comments and choose the best curve fit for specified standards from curve selection pull down menu in Mass Band window.

iii.   Click "Ok" to go back to "MW/MASS" window.
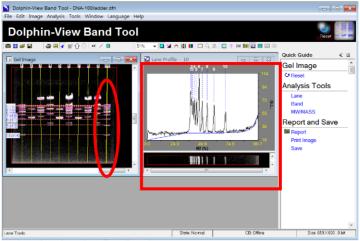
C-3-5-4. Lane profile
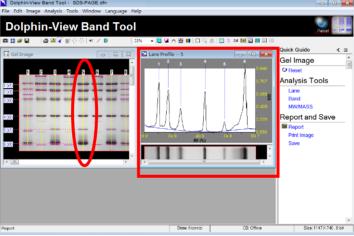
Click "Lane Profile" icon, or select and click "Lane Profile" from analysis menu to view the selected lane profile. For protein analysis lane profile displays OD (Optical Density) versus Lane and for DNA analysis it displays G.L (Gray Level) versus Lane.

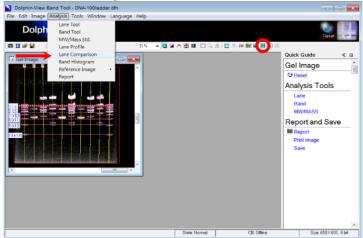Given below is an example of DNA analysis image for selected lane profile.

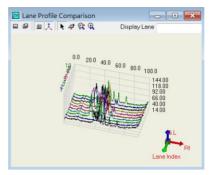Given below is an example of protein analysis image for selected lane profile.

C-3-5-5. Lane comparison

Click "Lane Profile Comparison" icon, or select and click "Lane Comparison" from analysis menu to view all the lane profile of the image in 3D.

In default mode the Lane Profile Comparison window will display all the lanes from the image in 3D.

⊟ **View front tool**

Click this tool to convert the image from 3D Map to 2D Map.

⊡ **View custom tool**

Click this tool to return back the image to default 3D Map image.

▦ **Show frame tool**

Select this tool to display coordinate frame on the image.

⋏ **Show small coordinate tool**

Select this tool to display 3D coordination axis of the image at the right bottom of the window.

➤ **Move tool**

Select this tool in order to move the 3D Map image on the window using cursor.

⚡ **Rotate tool**

Select this tool to rotate the 3D Map image using left mouse click. In general while using any other tools to rotate the 3D image right mouse click can be used.

🔍 **Map zoom tool**

Select this tool to enlarge or shrink the 3D Map image. Click holding the left mouse and moving cursor to the right will enlarge the 3D Map image and moving the cursor to the left will shrink the 3D Map image.

🔍 **Level zoom tool**

Select this tool to enlarge or shrink the single dimension of the OD axis. Click holding the left mouse and moving cursor to the right will enlarge the OD axis of the 3D Map image and moving the cursor to the left will shrink the OD axis of the 3D Map image.
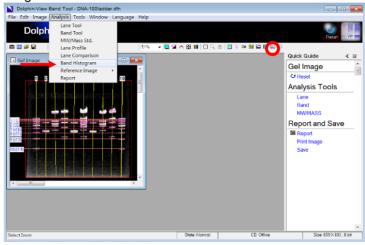
Display Lane [   ] **Display lane:**

Choose a particular lane or few lanes of interest to be displayed by typing the lane number(s) in
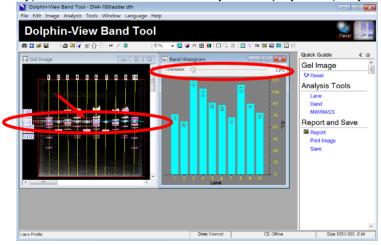
the display lane dialog box.

Note: For multiple lane numbers, separate each lane number by a comma.

C-3-5-6. Band histogram

Click "Band Histogram" icon, or select and click "Band Histogram" from analysis menu to view the band profile histogram.
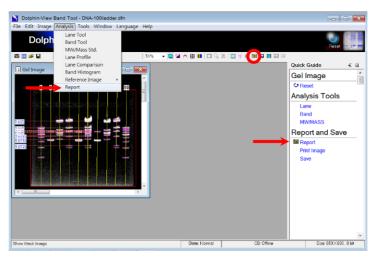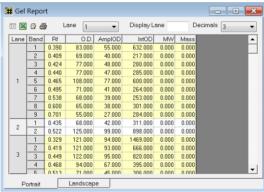

Click on any desired band profile or lanes to view the representation of band profile histogram. "Tolerance" in band histogram is the percentage of Relative Fragment Position (Rf.) Value to reference band (Recommended: 0.2% to 10%). For protein analysis band histogram displays OD (Optical Density) versus Lane and for DNA analysis it displays G.L (Gray Level) versus Lane.

C-3-5-7. Report

Click " Report" from quick guide or "Report" icon, or select and click "Report" from analysis menu to view the all the band information.

The default setting for the report window displays eight columns with lane and band information in the first two columns respectively. The next six columns describe the Rf, OD, Int.OD, Ampl.OD, MW and Mass of bands respectively.

- ⬥ Rf: Relative Fragment position. It calculates the distance from start point (0.0) of the lane to the end of the lane which is located at the end of the gel. By adjusting the value from lane tool the standard point can be adjusted.
- ⬥ OD: Optical Density. The value is set from the 256 partitions from black to white.
- ⬥ Int. OD = Band area OD Integration value
- ⬥ Ampl. OD = OD – background OD
- ⬥ MW: Band Molecular Weight
- ⬥ Mass: Band Molecular Mass

Note: The band information out of the standard curve range is displayed as N/A (not available) to minimize miscalculations.

🔲 Setup tool:

To change the band information display, click on "Setup" icon at the upper left corner of the

report window. Then select and check the items to be displayed by the report window in the setup dialog box.

⊠ Save to excel tool:
Allow user to export the report to excel.

📝 Save report tool:
Allow saving of the report as excel file format (.xls) or text file format (.txt). Click on the icon and a file-saving window will pop up. Input the file name, select the file format then click "Save" to save the file.
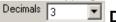
🖨 Print report tool:
Allow user to print the report. Click on the icon and a print report window will pop up. Select and input the printing format and the parameter. Then proceed to print the report by clicking "Print".

Display Lane [_____] **Display lane:**
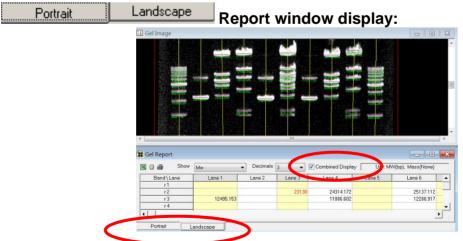
Allow user to choose a particular lane or few lanes of interest to be displayed by typing the lane number(s) in the display lane dialog box.

Note: For typing multiple lane numbers, separate each lane number by a comma.

Decimals [3 ▼] **Decimals:**

Allow user to choose the number of decimals for the results to be displayed from the "Decimals" pull down menu. The default number of decimals is 3 and the maximum number that can be chosen is 5.

[Portrait] [Landscape] **Report window display:**

User may choose the results window to be displayed in "Portrait" or "Landscape" format.
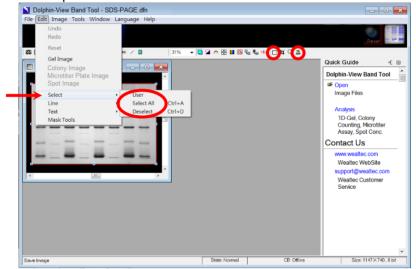
The default setup is portrait format. In portrait format, all the resulting analysis will be displayed and arranged in six different columns. For the landscape format, choose the result parameter to be displayed from the pop-up menu. To show the Mw or Mass value on the gel image, check "Combined Display" on right upper side of landscape format window.

C-3-6. 3D Map

Upon starting Band Tool software, images can be loaded from the disk. The tool bar will be displayed on top of the working window, provide tools to assist in processing further the image analysis.

C-3-6-1. Enabling 3D map tool
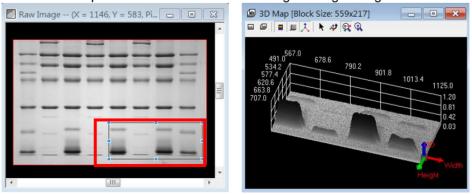
To enable the "3D MAP" icon click "Select" icon, or select and click "Select" from edit menu to choose the selection option "User" or "Select All Ctrl+A" or "Deselect Ctrl+D".

Click ☐ "Select" tool on tool bar and move cursor on image to select desired image area.

Click 3D MAP "3D Map" tool and select the image background color. The 3D Map window will pop up.

Given below is an example of 3D MAP of the selected region for gel image.

<u>C-3-6-2. 3D Map tools</u>

🖼 View front tool

Allow user to convert the image from 3D Map to 2D Map.

🖼 View custom tool

Allow user to return back the image to default 3D Map image.

🟥 Use color table tool

Allow user to display the 3D Map in ranging colors or in single color.

🏢 Show frame tool

Allow user to display coordinate frame on the image.

📐 Show small coordinate tool

Allow user to display 3D coordination axis of the image at the right bottom of the window.

🖱 Move tool

Allow user to move the 3D Map image on the window using cursor.

✢ Rotate tool

Allow user to rotate the 3D Map image using left mouse button. In general while using any other tools to rotate the 3D image right mouse button can be used.
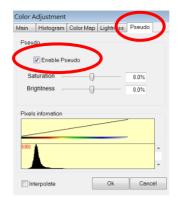
🔍 Map zoom tool

Allow user to enlarge or shrink the 3D Map image. Clicking and holding the left mouse button and moving the cursor to the right will enlarge the 3D Map image and moving the cursor to the left will shrink the 3D Map image.

🔍 Level zoom tool

Allow user to enlarge or shrink the single dimension of the OD axis. Clicking and holding the left mouse button and moving the cursor to the right will enlarge the OD axis of the 3D Map image and moving the cursor to the left will shrink the OD axis of the 3D Map image.
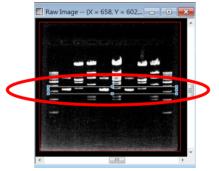
<u>C-3-6-3. Color 3D map image</u>

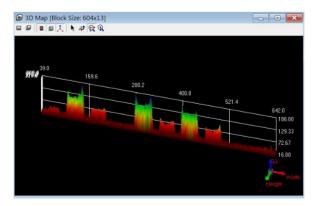1. Click 🟦 "Color Adjustment" tool on tool bar. Select "Pseudo" page and check "Enable Pseudo".

2. Click "Use Color Table" in 3D Map window to get color mode.

C-3-6-4. 3D map of single band profile

1. Click "Select" tool on tool bar and move cursor on image to select desired single band area.
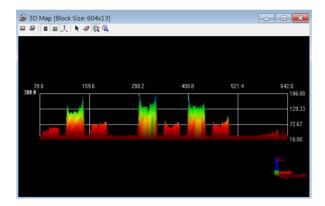

2. Click "3D Map" tool and the 3D Map window pops up. Click "Use Color Table" to display 3D Map in color mode.
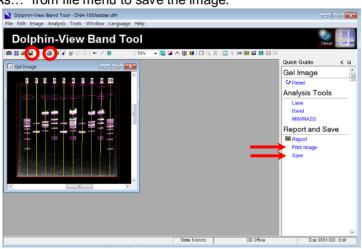

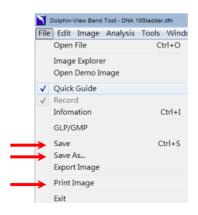3. To view the single band profile in 2D select 2D mode by clicking "View front".
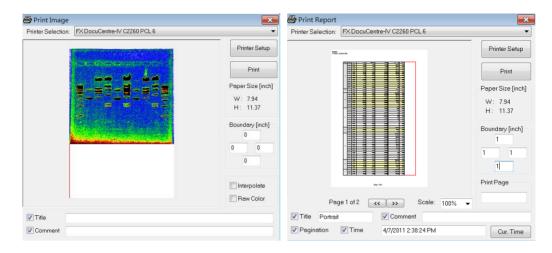
C-3-7. Print and save

Click "Print Image" from quick guide or "Print Image" icon, or select and click "Print Image" from file menu to print the image. Click "Save" from quick guide or "Save" icon, or select and click "Save" or "Save As…" from file menu to save the image.
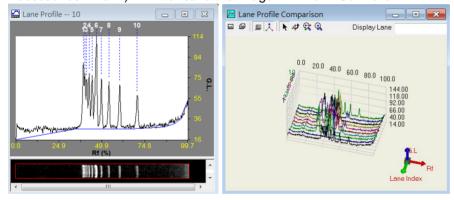

To print image or report, upon clicking the icon a "Print Image" or "Print Report" window will pop up. Input and select the printing parameter then click "Print".

Printing or saving the following images: Lane Profile, Lane Profile Comparison or 3D Map can be done by closing the quick guide and maximizing the images, then press "Print Screen" on keyboard and paste the image into the Microsoft Paint Software. (Start→Programs→ Accessories→Paint). Print or save the image with Paint Software.

C-4. <u>After use</u>

1. **Turn off the power of the system:**

    Once finish the operation of the KETA S imaging system, shut down the system by pressing on the start up button once. After the screen shut off, turn off the main power switch to "O" to close the whole system.

2. **Clean the sample touched surface:**

    Sample touched surface, including filter on the UV or B&W light transilluminator, should be cleaned with 75% EtOH pre-moistened Kimwipes or soft tissues after each use. Any residual buffer, dyes, and gels on the sample tray or filter will cause the contamination and damage to the sample tray and filter. Also make sure to have the surface dry after clean it.

3. Band Tool software can be used to analysis the image individually at anytime.

D. Care and Maintenance
D-1. Easy Maintenance

1. Main power switch should be turned off if the system is not going to use for over than one week.

2. Darkroom of KETA S can be cleaned with pre-moistened soft tissue soaked with clean water. Organic solvents or strong detergents may damage the instrument and should not be used.

3. CCD camera should be protected from all possible moisture, organic solvents and detergents.

4. Sample touched surface of KETA S system should be cleaned with pre-moistened soft tissues after every usage to avoid all possible contaminations and damages to the instruments.

5. Once the filter gets blurry, **DO NOT wipe it with kimwipes.** Filter can be cleaned through following procedures:
    a. Immerse the filter into distilled water in the beaker.
    b. Place the beaker with filter into the stainless steel basket in sonicator and perform the sonication for 30 minutes.
    c. Take out the filter and check whether it is cleaned or not.
    d. If yes, place the filter into 60 degree oven to dry for 3 hours.
    e. If not, put it back into sonicator again for another 30 minutes.

6. It's highly recommended to calibrate the KETA S system by quarter to maintain the best performance of the system.

D-2. Backup Battery Replacement

After KETA S system had been used for a period of time, backup battery might run out of juice and couldn't be recharged anymore. It might cause the system pending during system startup or shown with no keyboard detected all the time. Replace the backup battery by following procedures to solve the problem.

1. Disconnect the power cable and USB cables from the back of KETA S.

2. Unscrew to remove the back cover of the system and also remove the EMI cover on top of the main control PCB.

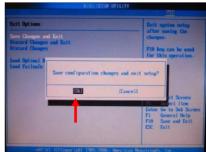3. Find the backup batter which attached on the main control PCB.

4. Remove the backup battery and replace with new one.
5. Put the back cover back on and connect all cables.
6. Apply with USB type keyboard and power on the system.
7. Keep pressing on "Del" button to enter the BIOS, and set by following procedures:
   a. After enter the BIOS, use ⟵ ⟶ to enter "Boot" -> "Boot Settings" -> "Boot Setting Configuration".

   b. Disable the "Quick Boot" function and press on "Esc" to back to main menu.
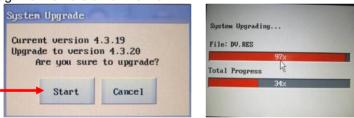   c. Exit the BIOS setting with "Save Changes and Exit". Choose "OK" to proceed and reboot the system.

  d. After restart the system, the KETA S system is ready for use.

D-3. <u>Software Update</u>

1. As the system was ready, click on "Freeze" to stop the capturing.
2. Plug in the USB memory stick with five updated files, prog.u01, prog.u02, prog.u03, prog.u04, and prog.upg. Make sure to put those files in the "Root" document of the USB memory stick.
3. Press to enter the "Setup" -> "Version" -> "Upgrade".

4. After press on the "Upgrade", system will search for the update file in the USB memory stick and recognize the version of the file.

5. Click on "Start" to proceed and the system will start update automatically.
6. After system updated, it will restart automatically. And the new version of software will show on the language selection window.

D-4. Quick Service Guide
Block Diagram

	Symptom	Probably Failure Parts	Recommended Replacement Parts
1	No response after power on	Check the grounded AC power source	None
		Fuse 3 A/250 V, 5 x 20 mm	P/N 8000002
2	After "Beep" sound, no display or display with "no cable"	Check power cable of the touch screen	P/N 8104124
		Check the LCD display power switch	None
		Check the VGA cable for LCD	PN 8104126
3	System hang up	Make sure the RAM stick inserted tightly	None
		Check the CF card inserted tightly or program failure	Reinstall the program
		System Board failure (SBC)	Replace with new system board
4	No image display on Live or freeze mode	Lens aperture is too small	Adjust the iris to have larger aperture
		No light source	Turn on the switch of light source
		Camera	Replace with new camera
5	Cannot initiate the camera	Camera was not connected	Check the connection of camera
		Connect with wrong USB port	Make sure the camera was connected to the left port at the rear side of system
		Driver was not installed correctly	Reinstall the driver
		Camera failure	Replace with new camera
6	Poor image quality or noise disturbance	Need to calibrate the system	Re-calibrate the system through "Setup" → "Camera" → "Calibration".
7	UV transilluminator no function	Take out the UV transilluminator to check	None
		Make sure the power switch "on" of the UV transilluminator	Switch on the power of UV transilluminator
		Check the fuse of UV transilluminator	P/N 8000002

		Power cable connection of the UV transilluminator	Check the cable cord of UV transilluminator
		Check safety interlock position or control board	None
8	Printed image different with captured	Check the LUT function of printer	Activate the LUT function while printing
9	USB no function	Incompatible USB memory stick	Make sure there is no anti-virus or MP3 program in USB memory stick
		USB cable	P/N 8104129
10	Blurry images	Adjust the Iris, Focus, and Zoom setting	Increase the Iris number to have smaller aperture
		C-mount dislocated	Re-adjust the C-Mount
		Molds or salt crystal on the filter	P/N 8100027 (HT-Amber), P/N 8100028 (Close up)
		Absence of close up filter	P/N 8100028 (Close up)
11	"Print" no function	Printer was not supported	Install the driver of the printer
		System board failure	Replace with new system board
12	No patterns or weak signal of the gel	Lens aperture is too small	Enlarge the aperture setting

E. Ordering Information

Catalog No.	Description
1147021	KETA S Image System, 120V, 50-60Hz, includes CCD camera, manual adjust lens, darkroom with Epi-white LED light, 2+ close up, EtBr filter, MD 25 UV transilluminator (25 x 25 cm), Band Tool software.
1147022	KETA S Image System, 230V, 50-60Hz, includes CCD camera, manual adjust lens, darkroom with Epi-white LED light, 2+ close up, EtBr filter, MD 25 UV transilluminator (25 x 25 cm), Band Tool software.
1147023	KETA S Image System, 100V, 50-60Hz, includes CCD camera, manual adjust lens, darkroom with Epi-white LED light, 2+ close up, EtBr filter, MD 25 UV transilluminator (25 x 25 cm), Band Tool software.
Accessories	
1144001	Dolphin-1D software
1144012	Dolphin-1D software instead of standard Band Tool software
1146001	UV/White light convert plate
1146002	Protection cover with support holders and 4 screws for gel excision
1146003	Digital thermal printer
1146021	BW-20 B&W light transilluminator 20 x 20cm with power adaptor and orange cover, 100-240V, 50/60Hz * Need to order 1147102 High transparent orange filter 49mm
1155005	MC 100-1 Multi-color W/G/B/UV (365 nm) in lieu of U10 as Epi source
8100027	High transparent amber filter