TFT-LCD

"GT-1P Series Module"

APPLICATION NOTE

APN810 Initial Issue (R1.00) March 7, 2018
R1.10   March 26, 2018
R1.20   June 15, 2018
R1.30   December 25, 2018

The GT-1P series display modules have a built-in touch display equipped with DVI video input and FLETAS touch panel on a full color TFT-LCD.

This document is prepared as technical support material for using GT-1P display modules..

1 INDEX

2　Scope

The "GT-1P Series Module" is a display system that has a FLETAS touch panel (Metallized Projective Capacitive Touch panel) attached to a full color TFT-LCD. It is a built-in touch display equipped with DVI (HDMI connector) for video input, and I2C, UART, and USB (HID compliant) for touch input. It has plug-and-play functionality with Windows-PC and SBC (Linux / Windows etc.)

PHOTO.1　GT800x480A-1303P

PHOTO.2　GT1280x800A-1303P
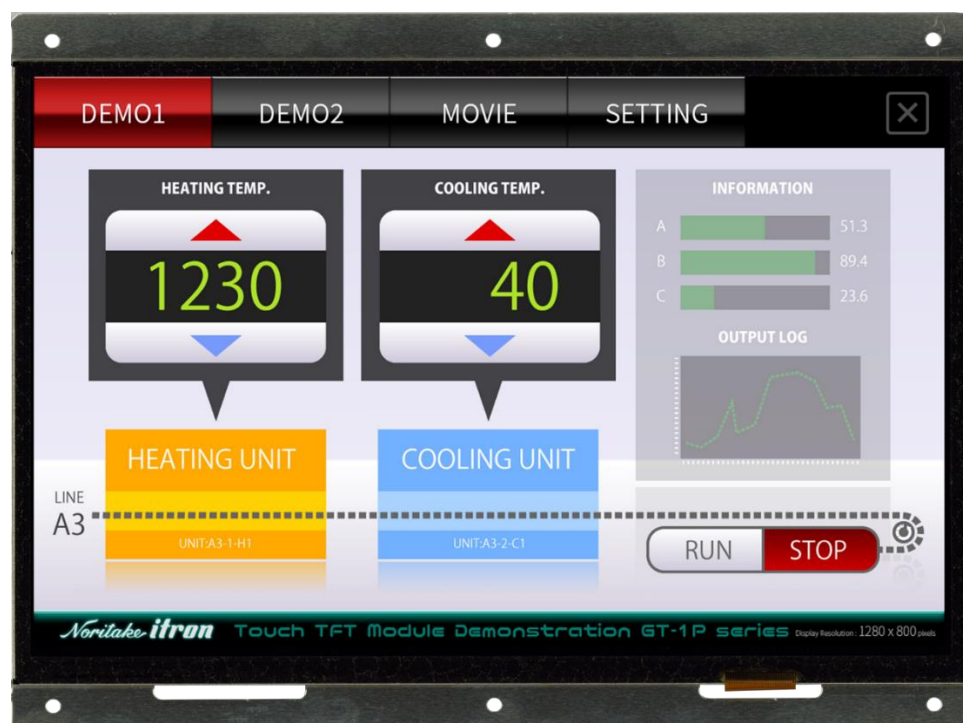
As long as the host is compatible, the touch display is a plug-and-play device.

3 GT-1P Series Module Line up
3.1 Part Number

Part number identifies product type

Example: GT800X480A-1303P

GT   : GT series

800X480   : 800X480 pixels

A   : Pixel Height ~ 1.19mm/pixel

    A=0.1 ~ 0.19mm

    B=0.2 ~ 0.29mm

    C=0.3 ~ 0.39mm

    D=0.4 ~ 0.49mm

    E=0.5 ~ 0.59mm

    F=0.6 ~ 0.69mm

    G=0.7 ~ 0.79mm

    J=1.0 ~ 1.19mm

-1303P   : 1P series
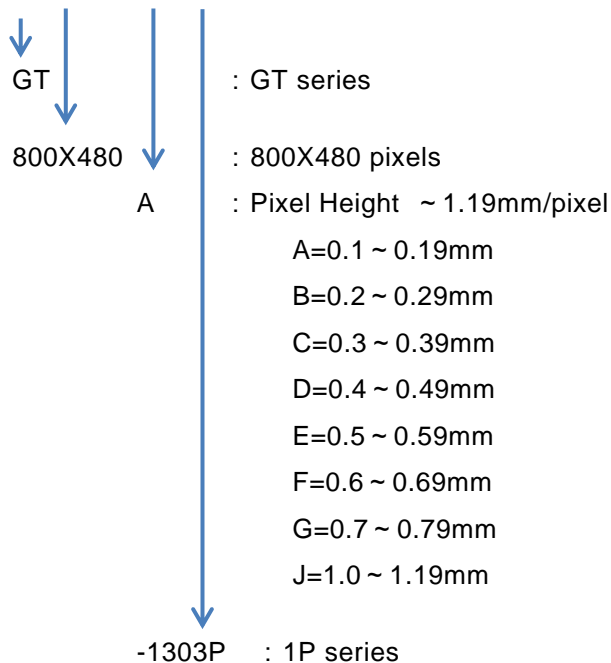
  Letters following '1' identify the following specification.

  13xxP: "DVI (HDMI connector)" for video input

  12xxP: "LVDS" for video input

  1x0xP: 5V for input voltage

  1xx3P: USB, UART, I2C for touch interface

In the same series, commands and main specifications are common. The above identifies the general features of GT-1P standard products. Detailed product information is presented on the specification of each product part number.

3.2   Standard Series Distribution Diagram

For information on a display that is not in the GT-1P series, please refer to its respective application note and specification.

Noritake Itron Display Module

├ Custom Module

│

├ Standard CU Series VFD Character Display Module

│

├ Standard GU Series VFD Graphic Display Module (Built-in font type available)

│

└ Standard GT Series TFT-LCD Module

   │

   ├ **GT-1P Series   Video Input Type**

   │   └ **GT-1303P**

   │   **Capacitive Touch Panel (FLETAS) Type, DVI (HDMI connector)**

   │

   ├ GT-C, Series   Command Type

   │   └ GT-C900

   │   Resistive Touch Panel Type

   ├ GT-CP Series   Command Type

   │   └ GT-C900PA

   │   Capacitive Touch Panel (FLETAS) Type

   │

   └ GT-EP Series   Intelligent Type

3.3   Applicable GT-1P Series Part Number

This application note covers the following products:

GT800X480A-1303P: 7 inch display
GT1280X800A-1303P: 10.1 inch display

For information on the latest product line up, please visit to our website or contact our sales office.

https://www.noritake-itron.jp/

4 Hardware

4.1 Block Diagram

The module consists of a TFT-LCD, a FLETAS touch panel, and control boards (touch control, power supply / display control).

4.1.1 （ GT800X480A-1303P ）
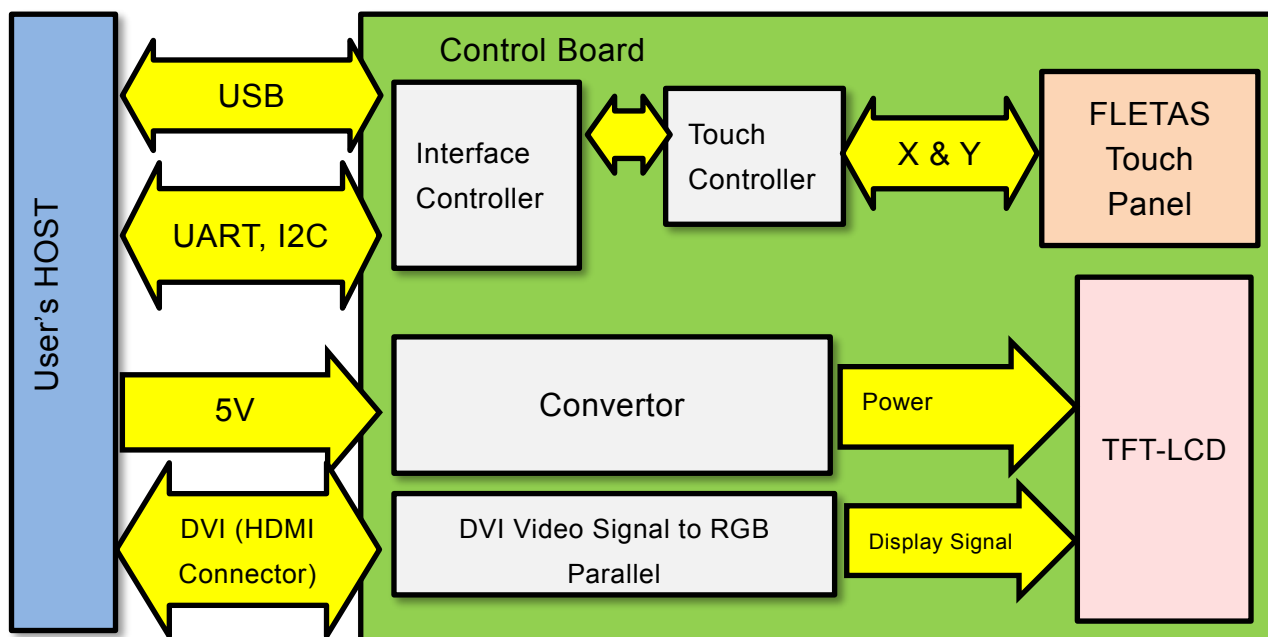
4.1.2 （ GT1280X800A-1303P ）
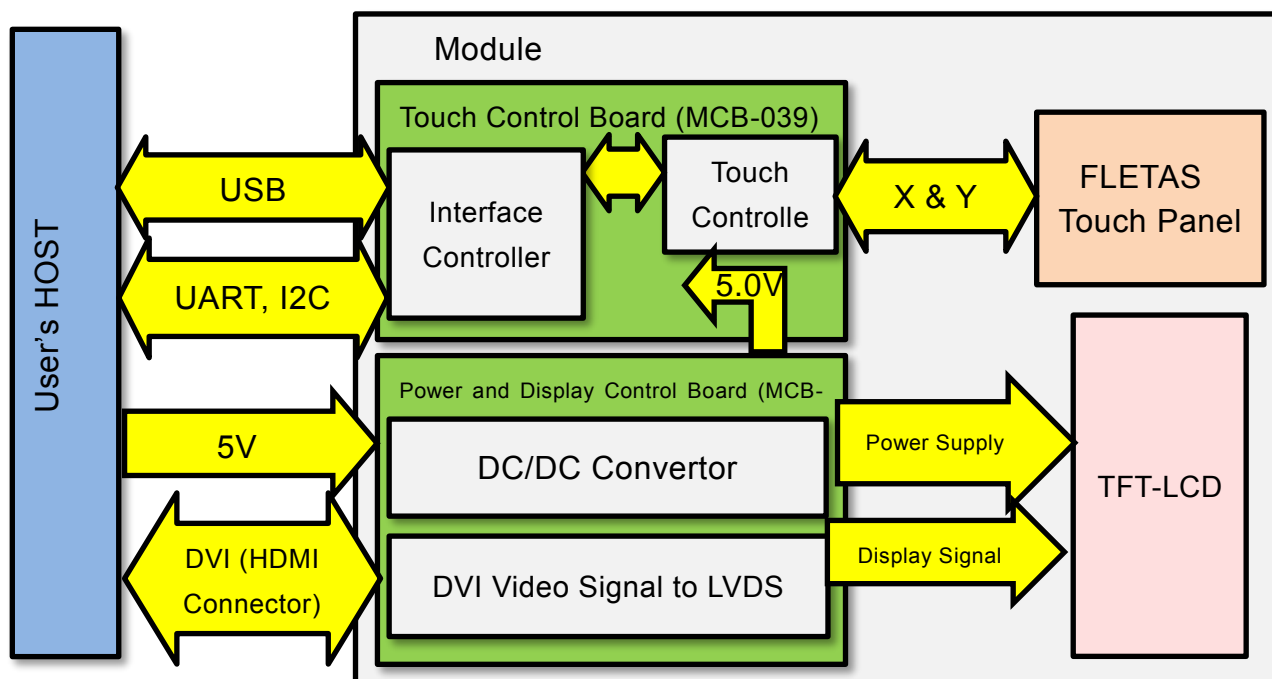
4.2 FLETAS Touch Panel

GT-1P series modules have a capacitive type touch panel.

It has a structure where X and Y electrodes are created by an aluminum thin film technique through an insulation layer on one glass substrate. Aluminum thin film electrodes utilize thin film processing technology, expertise accumulated through VFD manufacturing. The thin film aluminum electrodes contribute to lower impedance and higher light transmission ratio compared to ITO.

Glass

X Electrode

Insulation Layer

Y Electrode

Over Coat

X Electrode
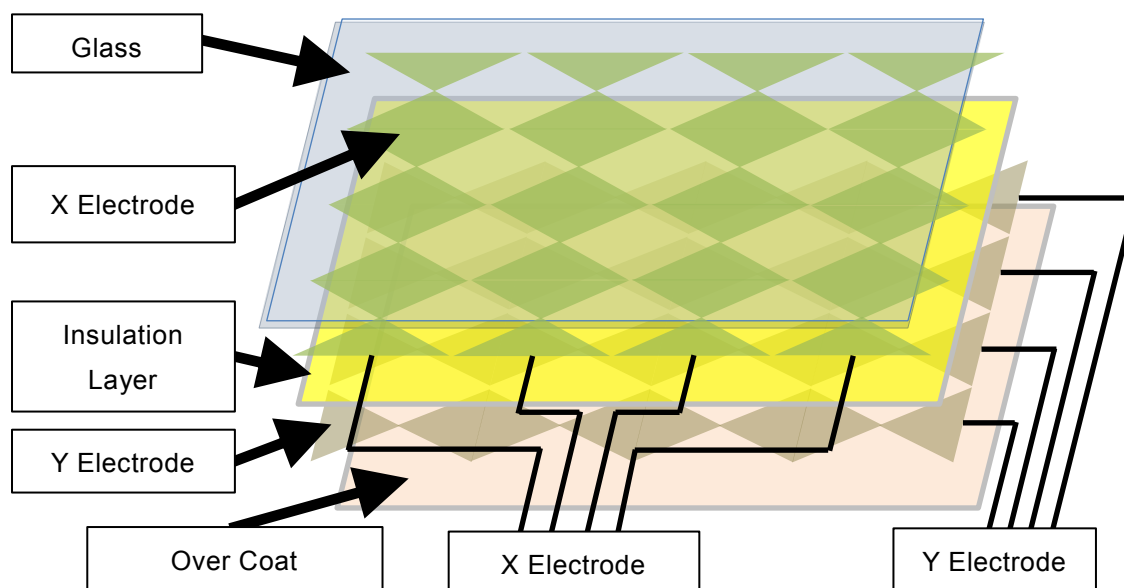
Y Electrode

4.2.1 Principle

An electric field is generated by applying voltage between the X and Y directional electrodes. The controller detects electric field fluctuation caused by approaching conductive materials such as a finger. Voltage is applied using progressive scanning so multiple touch points can be individually detected. Consequently, multi-touch functionality is available on FLETAS touch panel.

Glass Panel

X Electrode

Y Electrode

Insulation Layer

Over Coat (Insulation)
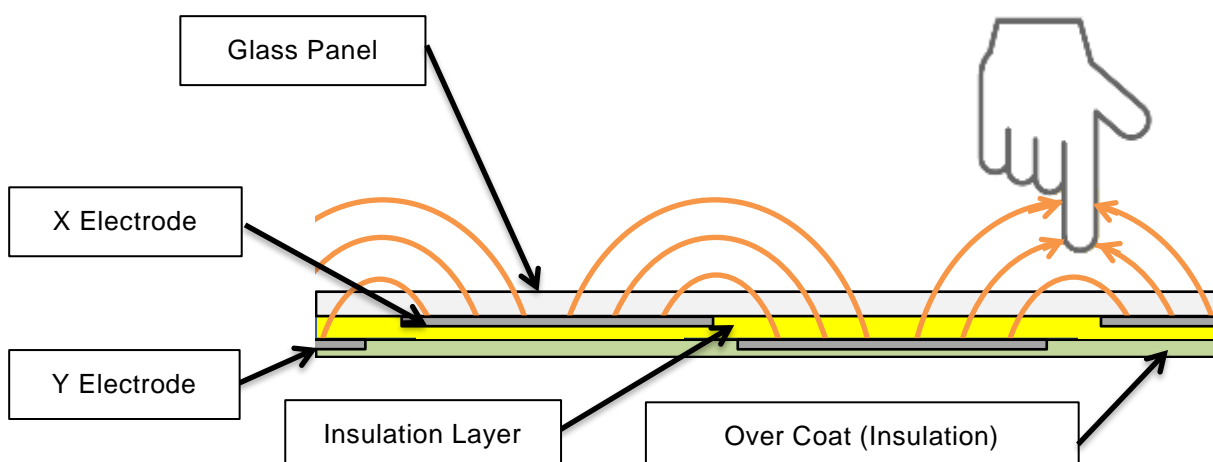
4.2.2 Touch Adjustment Basics

When a finger is placed on the touch panel,
the electric field changes. When the touch
level change exceeds the threshold value, a
touch is recognized.

The touch level increases as the distance between
the finger and touch panel decreases. However, when
gloves, an overlay, or air gap are used, the distance
between the finger and touch panel increases. As the
distance between the finger and the touch panel increases, the touch level decreases.

The overlay material also affects the touch level. Touch level will be higher with glass;
acrylic and polycarbonate will make it lower.

The lower the threshold value, the more sensitive the touch panel is. However, this increases the
risk of errors due to external noise. Since the touch level is influenced by incoming noise, if the
threshold value is too low, this noise may cause errors. It is important to adjust the threshold value
so there is a satisfactory sense of touch and ample amount of noise immunity..
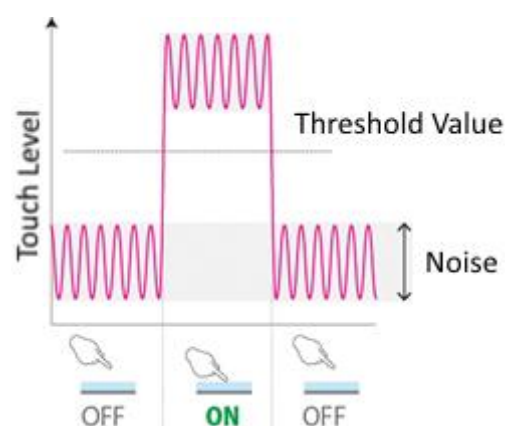
Influence of touch level by structure

Touch level	High	Low
Cover material	Glass	Acrylic, Polycarbonate
Cover thickness	Thin	Thick
Air gap	Narrow	Wide
Touch finger	Bare hands/Thin gloves	Thick gloves

Influence of upper and lower threshold values

Threshold	Decrease	Increase
Touch feeling	Light touch feeling	Insensitive touch feeling
Gloves	Even thick gloves are easy to react	No reaction with thick gloves
Noise tolerance	Very likely to malfunction	Not likely to malfunction

4.2.3   Capacitive Touch Panel Parameter Adjustment

To adjust and set the touch sensitivity, refer to the flow chart below:

```
                      ┌──────────────────────┐
                      │  Start touch threshold│
                      │     adjustment        │
                      └──────────────────────┘
                                 │
                      ┌──────────────────────┐
                      │ Apply cover material  │
                      │ on top of the touch   │
                      │        panel          │
                      └──────────────────────┘
                                 │
                      ┌──────────────────────┐
                      │ Select a threshold    │
                      │ value Refer 4.2.5     │
                      │ Threshold reference   │
                      │        value          │
                      └──────────────────────┘
                                 │
                      ┌──────────────────────┐
                      │ Change/Set the        │
                      │ threshold value       │
                      └──────────────────────┘
                                 │
                      ┌──────────────────────┐
                      │ Touch the touch panel │
                      │ and observe touch     │
                      │       reaction        │
                      └──────────────────────┘
                                 │
                      ◇ Touch is too sensitive ◇ ──Yes──► ◇ Threshold value is less than 255 ◇ ──Yes──► ┌ Increase the threshold value ┐
                                 │No                              │No
                      ◇ Touch is not sensitive enough ◇ ──Yes──► ◇ Threshold value is more than 0 ◇ ──No──► ┌ Non-compliant environment (Contact Noritake for special tuning) ┐
                                 │No                              │Yes
                      ◇ Threshold value is still reasonably adjustable ◇ ──Yes──► ┌ Apply a little higher threshold value. This may increase the margin between noise and signal and improve noise immunity. ┐
                                                                   ──► ┌ Decrease the threshold value ┐
                                 │No
                      ┌ Determine the threshold value ┐
                                 │
                      ┌──────────────────────┐
                      │ End of touch threshold│
                      │     adjustment        │
                      └──────────────────────┘
```

4.2.4 Setting the Threshold Value

Setting Method 1

Set the threshold value with "Touch parameter setting" command in the equipment's initialization sequence. The threshold value will be effective until the equipment is reset.

Setting Method 2

By registering the threshold value in its memory switch, the module will retrieve this new value after the module is reset. Register the threshold value in the MSW 59 with the "Memory Switch setting" command or support tool.

4.2.5 Threshold Reference Value List

Threshold value by overlay material and thickness

Test condition: Level when lightly touched with an index finger

Threshold Reference Setting Table (for acrylic)

Overlay Thickness(mm)		3		5	
Air Gap(mm)		0.3	1	0.3	1
GT800X480A-1303P **F1.04～Fx.xx ***	Threshold	2Ah	1Eh	1Ah	15h
	Single Touch	○	○	○	○
	Multi Touch	○	○	○	○
GT1280X800A-1303P **F1.00～Fx.xx *1**	Threshold	A0h	50h	-	-
	Single Touch	○	○	-	-
	Multi Touch	※1	※1		

*1: Fx.xx represents firmware version x.xx or later.

- : Not recommended ○: No problem

※ 1 : If the fingers are close together, the touch order may change

Threshold Reference Setting Table (for glass)

Overlay Thickness(mm)		1.3			3.2			5		
Air Gap(mm)		0.3	1	3	0.3	1	3	0.3	1	3
GT800X480A-1303P **F1.04～Fx.xx***	Threshold	64h	38h	14h	44h	29h	11h	31h	21h	0Eh
	Single Touch	○	○	○	○	○	○	○	○	○
	Multi Touch	○	○	○	○	○	○	○	○	○
GT1280X800A-1303P **F1.00～Fx.xx *1**	Threshold	A0h	A0h	20h	A0h	70h	00h	A0h	10h	-
	Single Touch	○	○	○	○	○	○	○	○	-
	Multi Touch	※1	※1	※1	※1	※1	※1	※1	※1	-

*1: Fx.xx represents firmware version x.xx or later.

- : Not recommended ○: No problem

※ 1 : If the fingers are close together, the touch order may change

4.2.6 About Water on the Touch Panel

Touch operation is possible even when the touch panel is wet with water. Operation reliability is greatly affected by the water conductivity, the amount of water drop sitting on the touch panel, and how the water is applied to the touch panel. If the conductivity is high and the amount of moisture remaining on the touch panel is large, touch may act erroneously (it may react at coordinates different from the touched coordinates). When operating in a wet environment, it is important to obtain a high touch level, set a high threshold value, and make the moisture less likely to stay on the touch panel. Please consider the following design points:

- Use a glass overlay.
- Use a thin overlay and air gap.
- Set the threshold value higher.
- Touch with bare hands or a very thin glove.
- Install the touch panel vertically so that water does not stay on the panel.
- Apply a water repellent coat to the cover material so that the water film does not stretch on the panel.
- Do not use metal (conductive material) for housing (especially the periphery of the touch panel).
- Do not allow water to come in contact with the touch panel and physical ground at the same time.
- Reduce the maximum number of touches. (use single touch if possible)
- UI only uses buttons, avoid slide or swipe.
- Keep distance between buttons.
- Use large buttons.
- Do not place a button on the edge of the screen.

UI Example:
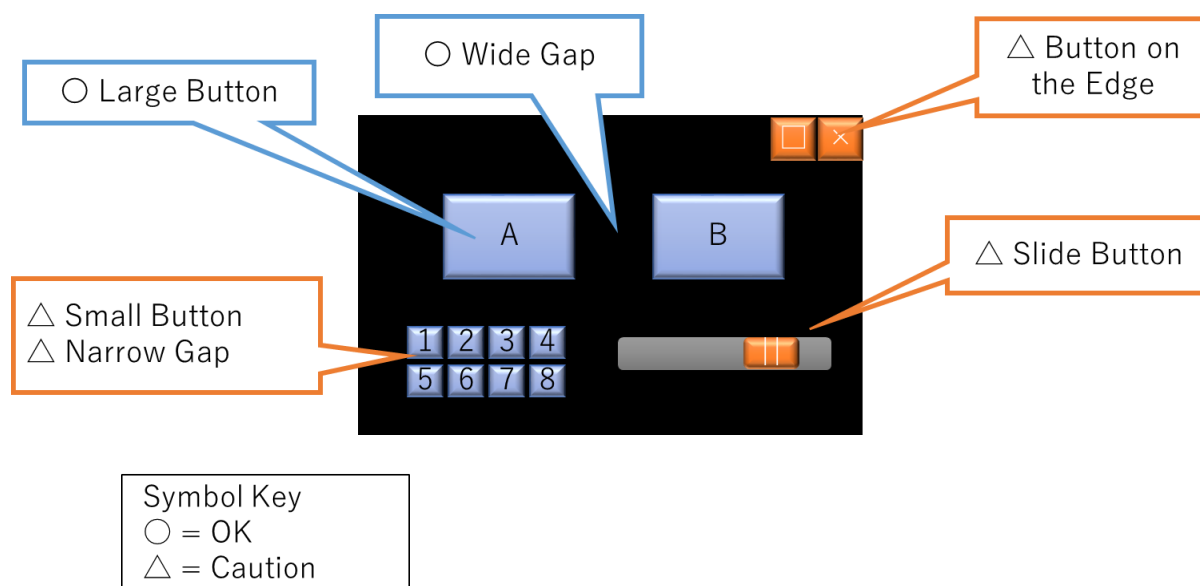
4.2.7　Incorrect touch suppression (GT800X480A-1303P: F 1.04 -)

In order to prevent runaway due to abnormal touch, the following function to suppress erroneous touch is installed. If individual touch panel tuning is required to adjust the effect and/or cancel the suppression function. Please contact us.

Palm touch control

If touch input covers a large area, such as a touch with the palm or a touch with a large amount of water, the area will be seen as abnormal and touch will be disabled. In order for this corrective action to work properly, a proper threshold value must be set. Otherwise, touch may be disabled/enabled unintentionally.

Continuous touch suppression

If the touch input has not moved for about 10 seconds, the touch input is deemed abnormal due to foreign matter and the touched area will be disabled.

4.2.8　Touch Setting Package (GT800X480A-1303P: F 1.04 -)

Touch setting package data contains parameters for detailed touch behavior control. By storing and selecting this data, you can make it behave differently from the default touch parameters. Four packages can be stored in addition to the factory default settings. Please consult us for package data provisions.

Package Storage

Specify the storage location of package data with "Touch Setting Package Data Store" command or support tool, and then store the package data into the dedicated flash memory.

Package Selection Method 1

In the initialization sequence (immediately after turning on the device), select the package to use with the "Touch Setting Package Selection" command. The selected package will modify the module's touch behavior. This is effective until you select another package or restart the module.

Package Selection Method 2

In the initialization sequence (immediately after turning on the device), select the package to use with the "Touch Setting Package Selection" command. The selected package will modify the module's touch behavior. This is effective until you select another package or restart the module.

4.2.9　About Individual Tuning

The default touch settings (factory setting touch setting package) is an adjustment value group intended to perform general-purpose touch behavior in a wide range of environments. Therefore, it may be necessary to individually tune touch configuration parameters for a customer's products. This kind of special tuning is required if changing the threshold values described in section 4.2.3 does not work. Please contact us for details.

5   Installation Method
5.1   Handling Precautions

· The touch panel is a glass product. Since the edges and corners are sharp, please be careful during handling and assembly. If a strong shock or stress point is applied to the panel, it may cause damage. The broken glass is extremely sharp. Please treat the glass with care and wear leather gloves for protection.

· Please do not touch the FPCs. Also, please do not install the panel in a way that introduces stress on the FPCs.

This product is comprised of precision electronic parts. Please handle carefully. When holding this product, please grab onto the PCB edges and do not touch the touch panel. Also, please follow static electricity handling precautions.

5.2   Installation Precautions

The FLETAS® touch panel is made of glass. To prevent breakage, be sure to protect the glass with an overlay. Please use insulating material, such as glass or acrylic, so that the protective cover material does not affect touch panel sensitivity. An example is illustrated in the figure below:
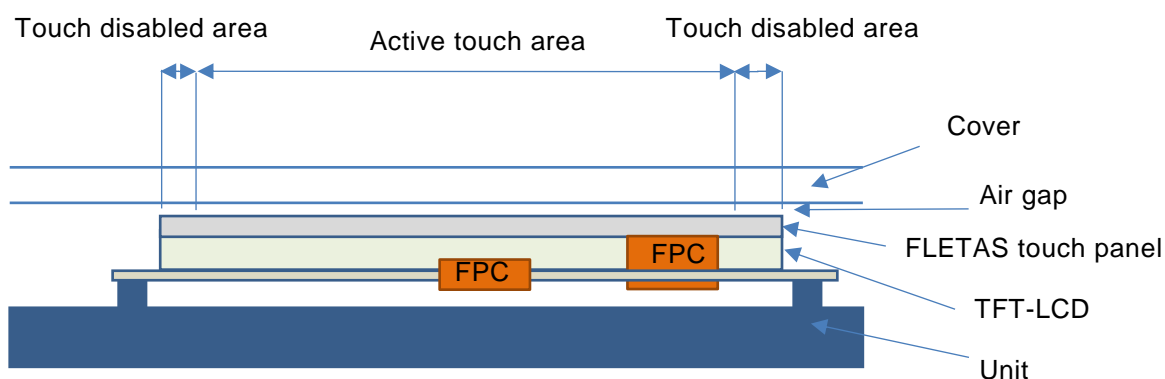
If the outer frame is made of a conductive material such as metal, please ensure that a 3mm or more horizontal gap exists between the touch area and the outer frame.

6   Connector

The GT-1P series implements HDMI, USB-Micro, serial interface, and power supply connectors.

A commercially available HDMI cable (Type A connector cable) can be connected to the module's HDMI connector. It receives a DVI-compliant digital video signal from this connector and displays video on the display (TFT-LCD). There is no audio signal output.
The digital video signal does not support HDCP copyright protection.
When the module receives a display signal, the LED mounted on the back of the board lights up. The HDMI cable can be inserted and removed regardless of the module's ON/OFF state.
Since EDID is supported, plug and play is possible. However, when using a Raspberry Pi, it is necessary to edit config.txt because there is no standard EDID parameter that matches the GT800X480A-1303P's resolution. (See 7.1.4)

The USB interface is USB 2.0 compatible (full speed: 12 Mbps). Simultaneous connection with the HID class driver and WinUSB driver is possible. As a "WinUSB" device, you can use the standard "WinUSB" driver. If you are using a custom driver or a USB interface with an embedded system, see Specification 6.1.2 "USB interface - Technical details". (Refer to 7.1.3)
On Windows 7, you need to install the WinUSB driver. It is installed by default in Windows 8 and later.

Power (VCC) is not supplied through the USB connector.

7 Software

7.1 How to Use the USB Interface

On the USB bus, GT-1P is recognized as a "USB Composite Device". For example, in Microsoft Windows, the following is seen in Device Manager:

（Windows 10）

（Windows 7）

As shown by Device Manager, this device has two "interface":

7.1.1 HID Compliant Touch Screen

Since the HID interface compliant, the OS's standard HID driver is automatically applied and touch input is immediately available.

7.1.2 WinUSB Device

Functions other than HID-compliant touch screen (for example, setting backlight brightness) can be accessed by another "interface" (WinUSB compatible device). Since a user can send and receive arbitrary bytes by calling the standard WinUSB API from the user's application, the commands described in the GT-1P specification can be used.

In Windows 8 and later, the WinUSB driver is loaded automatically, but in Windows 7 you may have to install it (see below). For Windows 10, the actual product name appears in Device Manager.

· Reload Device Manager

When the GT-1P's firmware is updated, it may be displayed as old version on Device Manager.

In that case, once the GT-1P is deleted from Device Manager and the GT-1P is turned off and on again, the correct version will be displayed in Device Manager.
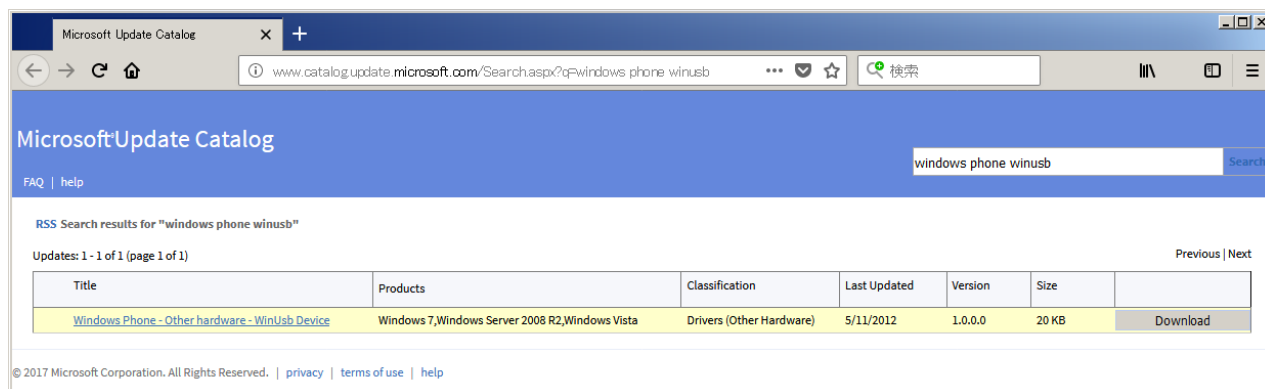
7.1.3　Windows 7 WinUSB Installation

HID compliant devices are displayed correctly in Device Manager, but if "WinUSB" is not displayed as shown below and the product name and "!" Are displayed, follow the procedure below.
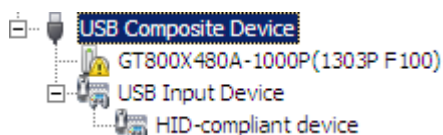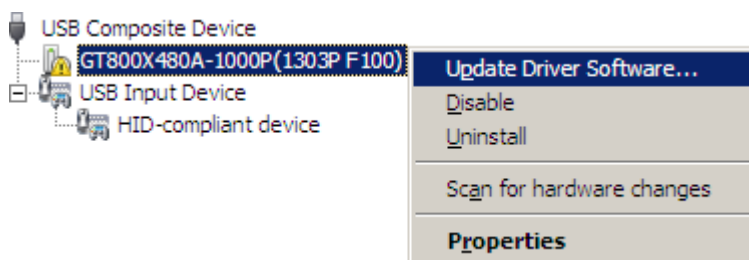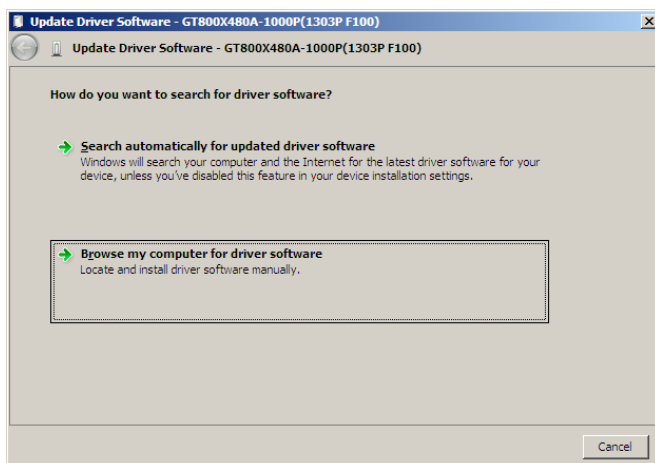

Download "Winusbcompat" at the following URL:

http://www.catalog.update.microsoft.com/Search.aspx?q=windows%20phone%20winusb

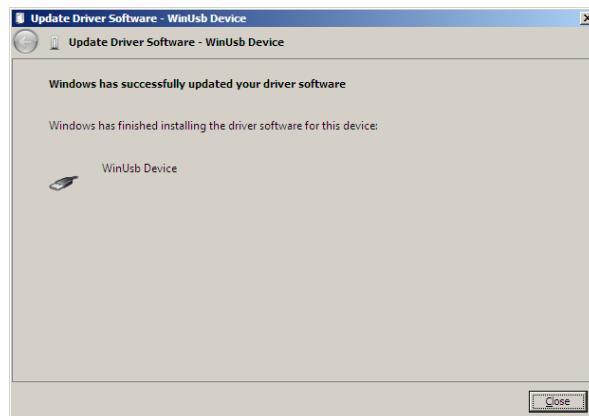**Install WinUSB on Windows 7**
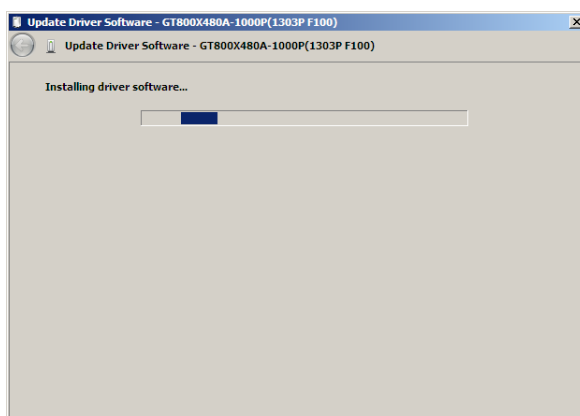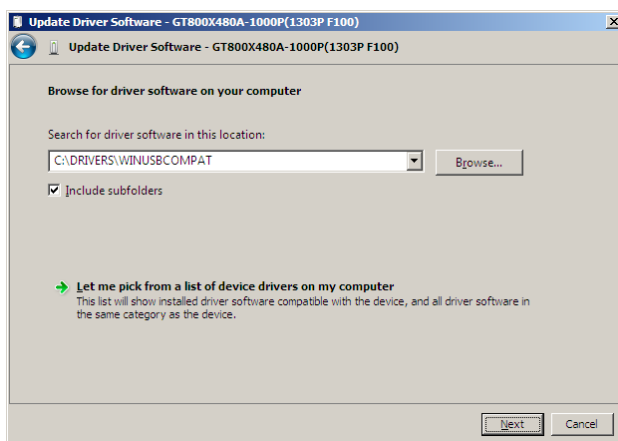
1. Right click on the product name and select "Update Driver Software".

2. Click "Browse my computer for driver software".

3. Specify the location of the winusbcompat folder and click "Next".

Commands can be transmitted to the GT-1P from applications using standard WinUSB functions. For details, refer to the GT-1P specification sheet, 6.1.2 "USB interface - Technical details".

7.1.4 GT800X480A-1303P Compatibility

The following contains the GT800X480A-1303P connection test results on each platform. Actual results may vary depending on the PC environment.

Platform	Digital Video (HDMI Type A connector)	Touch via USB	Command Execution via USB
Windows 7	The display works as a generic monitor. No driver required.	Touch works as a Human Interface Device (HID) compatible device and is recognized as a digitizer or mouse.	The latest WinUSB driver is required.
Windows 8.1 and 10	The display works as a generic monitor. No driver required.	Touch works as a Human Interface Device (HID) compatible device and is recognized as a digitizer or mouse.	The module works with the generic WinUSB driver. No additional drivers required.
Raspberry Pi 3 with Raspbian, Ubuntu MATE	EDID is not supported. It is necessary to edit "/boot/config.txt". (See note below) *1	Touch works as a Human Interface Device (HID) compatible device and is recognized as a digitizer or mouse.	Need a USB communication library. It has been tested with libusb.h.

*1   Please add this setting line to the "/boot/config.txt" file of Raspberry Pi in order to display the screen correctly.

hdmi_group=2

hdmi_mode=87 d

hdmi_cvt 800 480 60 6 0 0 0

Upon reboot, the video signal will change to fit the display's resolution.

No additional video signal configuration lines are needed to create a pixel perfect image.

7.1.5 Setting Example with Raspberry Pi (GT800X480A-1303P only)

When connecting GT800X480A-1303P to Raspberry Pi and performing initial installation of Raspbian, the installer starts up in the 640 x 480 dot mode and installs because EDID does not include the 800 x 480 dot setting. This will result in a vertical black bar on the right side of the screen.

When the installation is complete, add the following line to the /boot/config.txt file:

hdmi_group=2
hdmi_mode=87
hdmi_cvt 800 480 60 6 0 0 0

Additional configuration lines are optional.

· Operation Method (example)

With Raspberry Pi Model B 3, you can edit it using the standard editor "nano" in the following procedure:

1. Launch the command prompt from the task bar.
2. Type the following command:
$ sudo nano /boot/config.txt

    3.   Add the following line to the text file:

hdmi_group=2
hdmi_mode=87
hdmi_cvt 800 480 60 6 0 0 0

4. Type Crtl-O and press the enter key.

5. Restarting the host system, will now let you use the full screen of 800 x 480 pixels

Since this new setting selects an 800 x 480 resolution, the host system can be used even if it's connected to another display with the same resolution.

7.2 Initialization of Display by Command

The display will initialize each setting with the ESC @ (1bh, 40h) command.

The data in the receive buffer is not erased.

MSW 46, 47, 48, 49 are not reloaded even if the initialize command is executed after Memory Switch setting change. These new memory switch settings are only reflected after turning the power off and on.

7.3 Initialization and Write Protocol

Simply transmit the video data after turning on the power. By default, basic operation is performed without any special settings. Setting changes such as touch sensitivity adjustment can be done with ESC expansion command sequences as needed.

7.4 Memory Switch Setting

Depending on memory switch settings, the display module can be operated with non-default setting values at startup. For other items, you can change the setting by sending a command after startup.

Memory Switch

SW No.	Item	Contents	Valid Range	Default
5	Brightness level setting	Sets the backlight brightness level.	00h-FFh	FFh
46	I2C slave address setting for HID(*1)	Set the I2C slave address. (for HID)	08h-77h	51h
47	I2C slave address setting for Noritake original commands	Set the I2C slave address (for Noritake original commands)	00h, 08-77h, 88-F7h(*2)	50h
48	UART baud rate setting:	Sets the asynchronous serial port baud rate. 00h: 38400bps 01h: 4800bps 02h: 9600bps 03h: 19200bps 04h: 38400bps 05h: 57600bps 06h: 115200bps	00h-06h	00h (38400bps)
49	UART Parity	Configure asynchronous serial port parity. 00h: None 01h: Even 02h: Odd	00h-02h	00h (None)

58	Touch sensitivity (signal gain) setting (*3) (*4)	Sets the touch panel sensitivity (signal gain).	00h-0Fh	06h
59	Touch sensitivity (threshold) setting	Sets the touch panel sensitivity (threshold).	00h-FFh	50h
62	Touch sensitivity setting selection at startup (* 3)	Select touch sensitivity setting at startup. 00h: Apply MSW 58 and MSW 59 01h: Apply touch setting package	00h,01h	00h
63	Touch setting package selection at startup (* 3)	Select touch setting package at startup. 00h: factory setting 01h: Package 1 02h: Package 2 03h: Package 3 04h: Package 4	00h-04h	00h

* When the memory SW contents are out of the effective range, the factory setting value is used.

*1: When the lower 7 bits of MSW 46 and MSW 47 have the same value, MSW 46 is invalid and MSW 47 takes precedence.

*2: When bit 7 (MSB) is "1", this product will respond even at the general call address (00h).

*3: GT800X480A-1303P only

*4: MSW 58 (signal gain) should not be changed from its factory setting (06h); touch sensitivity adjustment should be done with MSW59 (threshold) only.

Effecting Memory Switch Change

Some memory switches are effected with the initialize command after the command is executed, others are not effected until the power switch is turned off and then turned on again.

	Effected by Initialize Command	Effected by Turning on Power Again
Memory switch No.	5,58,59,62,63	46,47,48,49

7.5 Command code table (in order of code)

These commands work with USB (WinUSB compatible interface), UART, and I2C. The commands in this chapter are Noritake Itron original product commands. The commands in this section cannot be used with HID class conforming protocols.

No.	Command Name	Hex Code (hexadecimal code or parameter, "parameter name. number" indicates the bit length of the parameter.)										
1	Initialize	1Bh	40h									
2	Memory Switch Setting	1Fh	28h	65h	03h	a<=3Fh	b.8					
						a=FFh	b.8	c(1)	d(1)	…	c(b)	d(b)
3	Memory Switch Data Send (Single-sending)	1Fh	28h	65h	04h	a<=3Fh						
4	Memory Switch Data Send (Multi-sending)	1Fh	28h	65h	04h	a=FFh	b.8	c.8(1) … c.8(b)				
5	Product Status Send	1Fh	28h	65h	40h	a.8	[b.8	c.8]				
6	Touch Setting Package Data Store (* 1)	1Fh	28h	65h	1Ch	a.8	d[1]	…	d.8[1024]			
7	Touch Parameter Setting	1Fh	4Bh	70h	a.8	[b.8	c.8]					
8	Touch setting package selection (* 1)	1Fh	4Bh	70h	10h	a.8						
9	Touch Mode selection Single-touch Mode/Multi-Touch Mode	1Fh	50h	01h	n.8							
10	Touch Panel Data Transmit ON/OFF for command control	1Fh	50h	20h	m.8 =0/1							
11	Touch Panel Data Transmit ON/OFF for HID(*2)	1Fh	50h	22h	m.8 =0/1/2/3							
12	Backlight Brightness Level Setting	1Fh	58h	n.8								

*1：Only GT800X480A-1303P *2：Only GT1280X800A-1303P

Commands are sorted by hex code.
User defined parameters are represented with a letter and number separated with a period and the possible parameter values follow.
For example, x.16 means that parameter "x" is 16 bits (or 2 bytes). The byte order for multi-byte parameters is least significant byte (LSB) first.
In the software specification, x.16 is denoted as xL, and xH (lower and higher byte). For detailed command information, refer to the software specification.

8 Precaution

8.1 Reset

The display unit controller performs internal initialization processing at power-on. Since there is danger of losing data during this period, please do not write data or commands until the 200ms initialization sequence is complete.

A reset pulse (active = LO) of at least 1ms is required to reset the module.

A maximum wait time of 100ms is required before the module can receive data after a reset.

8.2 Afterimages

Image persistence may occur if the same screen is displayed for a prolonged period of time. The effect will gradually disappear by displaying a screensaver pattern or by powering off the display. The time needed for the effect to disappear is not fixed, as it depends on the exact usage, screen settings, power settings, environmental temperature, etc.

To avoid image persistence, it is recommended to avoid displaying a fixed pattern or the same image for a prolonged period of time

8.3 Display Disturbance

If hosts that do not support EDID or have set display conditions on their own, the display clock frequency may be out of the specified range and erroneous display may occur.

Please use the frequency within the range stated in the specification sheet.

9 Support TOOL

We are always creating and updating support tools that support initial evaluation and data creation, so please use them.

Program examples are uploaded to our support page from time to time, so we hope that you can use them.

> *Our website:* https://www.noritake-itron.jp/eng/index.html
>
> *Technical support page:* https://www.noritake-itron.jp/eng/cs/index.html

9.1 GT-1 Pass

This tool allows the user to easily change/register various settings (touch sensitivity, backlight brightness, communication settings, etc.) on GT-1P modules using a Windows PC. The user can reset all settings to factory default and output specific command byte sequences to text that can be used via serial communication.

9.2 WinUSB Driver for Windows 7

For Windows 7, you need to download and run the installer from the Microsoft site.

For Windows 8.1 or later, WinUSB driver installation is not necessary.

10 Environmental Compliance

10.1 ISO 14001 Certification

The creed of Noritake, i.e. the principles of quality products and co-prosperity from a global viewpoint, provides a basis for consideration for the global environment. Noritake strives to develop a clean production process, produce green products with less environmental impact to provide society with products, and services that are gentle to people and the environment. Noritake Itron Corp. is an ISO14001 certified company.

10.2 RoHS Compliant

The GT-1P series standard products are RoHS compliant.

11 Disclaimer and Restrictions

Any information and TOOLs published in this document are carefully evaluated; however, correctness of performance under all environmental conditions have not been proven. Whole or partial sample code may be copied to use with our products. In this case, sample code users shall take responsibility to check the final product's performance (i.e. application software, embedded code, etc.). Support TOOLs provided in installer style may include programs licensed from a third party. Any style of analysis, reverse compilation, reverse engineering, or relevant acts are prohibited.

12 About Trademarks of Other Companies

● Windows is a registered trademark of Microsoft Corporation in the United States and other countries.

● Other company and product names are registered trademark of those respective companies.

13 Contact

For any assistance, questions or inquiries, contact Noritake local sales office or customer support at:

cs@noritake-itron.jp