itron

RoHS Compliant

TFT LCD Module with Metallized Projective Capacitive Touch Panel

Hardware Specification

Model: GTWV070S3B00PW

Specification No: DS-2170-0001-01

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This specification is subject to change without prior notice.

This product complies with RoHS Directive Please contact our sales consultant for details and to confirm the current status

Notice for the Cautious Handling of LCD Modules

Handling and usage precautions:

Please carefully follow the appropriate product application notes and operation standards for proper usage, safe handling, and maximum performance.

[Construction]



The touch panel is made of glass.

When using this product, please be sure to install a protective overlay such as cover glass, acrylic plate, etc.



Please handle the touch panel very carefully as it may crack if it is pressed with excessive force.



If this product is bent or twisted, it may cause the breakage of the product. Please handle it very carefully without bending or twisting.



Please do not hold the FPC or other cables on this product as it may disconnect vital components.



The end faces of the touch panel are not polished. Please handle it very carefully to avoid injury.



The touch panel is made of glass.

It may be damaged by falling / impact / excessive vibration. In the unlikely event that the glass shatters, please handle the glass fragments very carefully to avoid injury.



The LCD panel generates heat. Please provide clearance for heat dissipation between this product and its enclosure. Also, if a structure has electronic parts that are densely collected near this product, we recommend that it be cooled with a fan or something similar.

[Cable Connection]



Please do not remove the power cable and signal cable if the product is in an energized state. It may cause damage to the power supply circuit and/or the I/O circuit of this product.



As a rule of thumb, please do not input any signals while the product is not receiving adequate power. It may cause damage to the input/ output circuit.



When plugging-in or unplugging the cable for this product, please do not apply excessive force, such as pulling the cable.

Please plug-in or unplug in a straight direction (alignment) with the terminal, without bending or twisting forces.

If it is not properly plugged-in or unplugged, damage may occur to the cable or connector.



Please avoid sudden bending of the cable from the base of the plug. It may cause damage to the cable or disconnection of the connector. If loads are expected on connectors and cables, use cable ties, etc.

[Electrostatic Charge]



This product uses semiconductor components, so please take precautions against electrostatic discharge during handling and transportation.

(If it is judged that the product is defective due to electrostatic destruction during its return to our company, it may be repaired for a fee.)

[Power]



Please use a fully stabilized power supply. If the power supply's voltage is outside of the product's rated supply voltage, the operation of the power supply circuit may become unstable.



In-rush current flows when turning the power on. Please use a power supply that can withstand more than twice the normal current.



As a safety measure, we recommend using a power supply with overcurrent protection and a fuse.



Please confirm that the power supply voltage is within the rating of the connector. Please use a power cable with the appropriate thickness and length.

[Interface]



Please use an interface cable that has a length that has been thoroughly verified.

[Implementation]



When installing this product, please make sure that the on-board electronic components and FPC do not touch the metal chassis. It may cause the product to malfunction.



If you need to make the product drip-proof, please use waterproof measures for products by using rubber etc.



Please handle the product carefully when you take it out from the case and when you install the product, since it is a precision part.

[Storage and Operating Environment]



Please use this product within the environmental condition range stated in its specification.

Exceeding the stated temperature, humidity, vibration, and impact limitations (or other stated limitations) may cause malfunction.



Please do not exceed the absolute maximum ratings stated in the specification even for a moment. It may cause malfunction.



Under a high temperature environment, the touch panel surface also becomes hot. If you touch the panel with your bare hand, please be careful of burns, injury, etc.



Malfunction may occur when the product is stored and/or used in environments with a lot of salt, sulfur, dust, etc.

[Disposal]



When disposing of this product, please follow the relevant regulations.

[Others]



Do not reverse engineer this product (i.e. firmware disassembly).



Do not modify, disassemble, repair, replace parts, etc.

It may cause EMI failure, etc.

(We cannot assume responsibility for troubles caused by modifying these products.)



This specification does not give license of the intellectual property rights that our company owns. Also, it does not guarantee the implementation of a third party's rights.



Neither whole nor partial copying of these specifications is permitted without our approval. If necessary, please ask for assistance from one of our sales consultants. This product is designed with careful attention to FMI and FSD. However, the characteristics



This product is designed with careful attention to EMI and ESD. However, the characteristics of EMI and ESD change when the product is incorporated into a system. Please be sure to perform testing with the finished product. When used in noisy environments, please take measurements against noise around the casing.



This product is not designed for military, aerospace, medical, or other life-critical applications. If you choose to use this product for these applications, please ask us for prior consultation or we cannot accept responsibility for problems that may occur.



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, etc, 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, and 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.

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1 **General Description**

This specification corresponds to the hardware aspects of the GTWV070S3B00PW, which is a TFT-LCD graphic display module with metallized projective capacitive touch (touch panel).

This product enables visual components (objects) to be arranged within display screens (pages). combined with integrated touch function, thus creating a complete graphical user interface.

1.1 Construction

The module consists of an 800 x RGB X 480 color graphic TFT-LCD with touch panel, refresh RAM, character generator, DC/DC converter, microcontroller, and all necessary control logic.

1.2 **Outline**

Diagonal 7.0 inches, 800×480 pixels, Display:

32K colors (15-bit color (RGB 5-5-5)

65K colors (16-bit color (RGB 5-5-5 + 1bit intensity)) (Intensity: RGB common least-significant bit.)

Single 5 VDC Power supply:

Interface: Serial interface (UART/ I²C / SPI/ CMOS 3.3V)

USB interface (High-speed / full-speed)

I/O port: 26 bits general-purpose I/O port

Function: GUI control functions:

GUI operation control

Page control Object control

Register / Readback function Page/Object Register, Backup

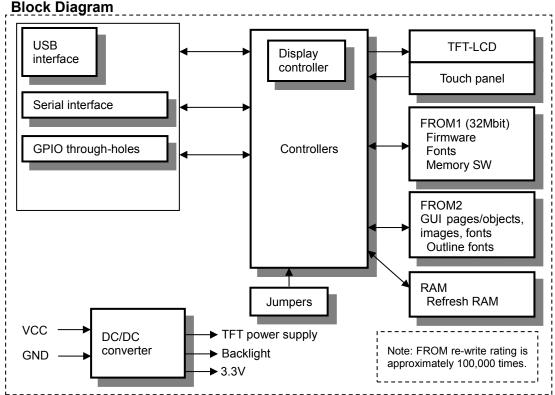
Image register Font register

Memory Switch setting Touch Panel control function Overall control function

Other functions

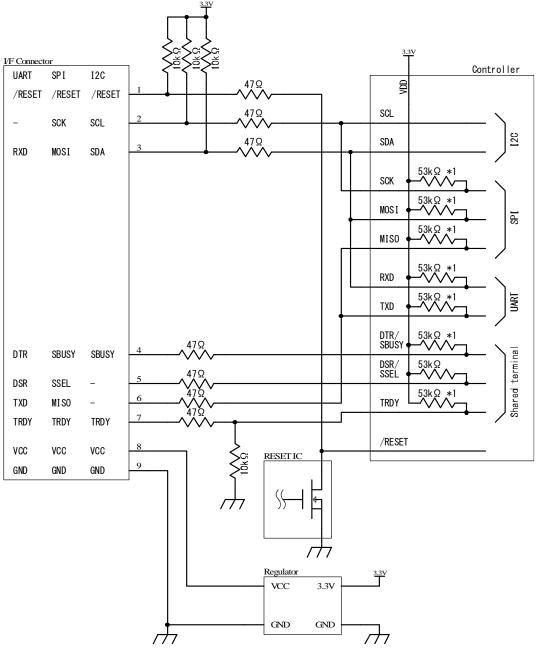
Related specifications: DS-2154-0003-xx: "General Function" Software Specification.

1.3



1.3.1 Serial Interface

The figure below is a schematic diagram of the internal connection of the serial interface and power.



Refer to 7.2 "Serial Interface (CN9)".

*1: The CPU's internal pull-up resistor will turn on at power-on, reset input, and internal initialization of the display.Pull-up resistors are connected to the internal power (3.3V).

The controller's internal pull-up resistors do not function at power-on until the internal 3.3V rises, which means that those signals shown above which are not connected to a 10k pull-up or pull-down resistor will be high-impedance during this time.

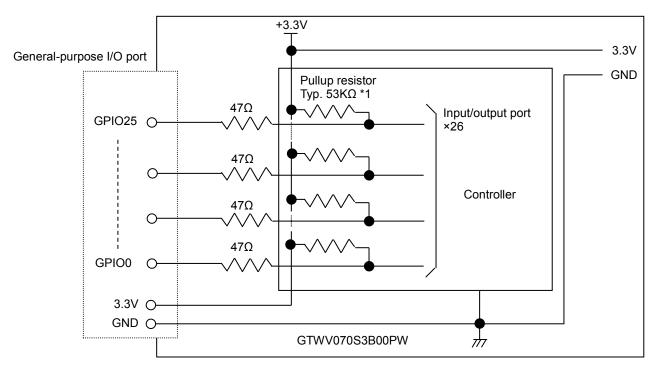
Note:

The /RESET signal must only be driven (if necessary) by an open drain output.

Internal 3.3V power rises up to 300ms after VCC (5V) power reaches 4.75V. HI-level signal input prior to the internal 3.3V rising may cause boot failure. Input terminals should therefore be held LO, or left in high-impedance state for 300ms after applying VCC power.

1.3.2 General Purpose I/O Port

The figure below is a schematic diagram of the internal connection of the general-purpose I/O port.



*1: The CPU's internal pull-up resistor will turn on at power-on, reset input, and internal initialization of the display.Pull-up resistors are connected to the internal power (3.3V). The controller's internal pull-up resistors do not function at power-on until the internal 3.3V rises, which means that those signals will be high-impedance during this time. If this temporary high impedance can be tolerated, an external pull-up or pull-down resistor is not Required.

Refer to 0 Electrical Characteristics, "General purpose I/O port and power 3.3V". For controlling, refer to "General Function" Software Specification, "I/O Port Input / Output Setting", "I/O Port Output", and "I/O Port Input".

Note:

Internal 3.3V power rises up to 300ms after VCC (5V) power reaches 4.75V. HI-level signal input prior to the internal 3.3V rising may cause boot failure. Input terminals should therefore be held LO, or left in high-impedance state for 300ms after applying VCC power.

Electrical Specifications 2

Absolute Maximum Ratings Power supply voltage 2.1

Parameter	Symbol	Min.	Тур.	Max.	Unit	Note
Power supply voltage	VCC	-0.3	-	+6.0	V	-

Logic voltage

	Parameter	Symbol	Min.	Тур.	Max.	Unit	Note
UART	Logic input voltage RXD, DSR	VsIN1	-0.3	-	+3.6	V	VCC=5.0V
I ² C	Logic input voltage SCL,SDA	VsIN2	-0.3	_	+3.6	٧	VCC=5.0V
SPI	Logic input voltage SCK, MOSI, SSEL	VsIN3	-0.3	_	+3.6	V	VCC=5.0V
RESET	Logic input voltage /RESET	VsIN4	-0.3	-	+3.6	٧	VCC=5.0V
I/O port	Logic input voltage port 0, 1, 2, 3	ViIN	-0.3	-	+3.6	V	VCC=5.0V

2.2 **Electrical Ratings**

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	Parameter	Symbol	Min.	Тур.	Max.	Unit	Note
Power supply	Power supply voltage	VCC	4.75	5.0	5.25	VDC	-
UART	Logic input voltage	VsIH1	2.7	-	-	VDC	-
UART	RXD, DSR	VsIL1	-	-	0.6	VDC	-
I ² C	Logic input voltage	VsIH2	2.7	_	_	VDC	Internal pull-up
1-0	SCL,SDA	VsIL2		_	0.6	VDC	resistor 10kΩ
SPI	Logic input voltage	VsIH3	2.7	_	_	VDC	_
581	SCK, MOSI, SSEL	VsIL3	_	_	0.6	VDC	_
RESET *1	Logic input voltage /RESET	VsIL4	1	-	0.6	VDC	-

*1: Please use open-drain output.
All driving voltage for the TFT-LCD is generated from the on-board DC/DC converter.

2.3 Electrical Characteristics

Logic input / output condition

Measuring conditions: ambient temperature = 25 °C, VCC=5.0VDC

Para	ameter	Symbol	Min.	Тур.	Max.	Unit	Condition
UART	Logic output voltage	VsOH1	2.8	-	-	VDC	IOH = -1.6mA
UART	TXD, DTR *1	VsOL1	-	-	0.4	VDC	IOL = 1.6mA
	Logic outputvoltage	VsOH2	2.8	1	-	VDC	IOH = -1.6mA
	TRDY, SBUSY *1	VsOL2	-	ı	0.4	VDC	IOL = 1.6mA
I ² C I/F	IInternal pull-up rresistance SDA,SCL *2	Rp		10		kΩ	-
	Logic output voltage	VsOH3	2.8	-	-	VDC	IOH = -1.6mA
SPI	TRDY, SBUSY, MISO *1	VsOL3	ı		0.4	VDC	IOL = 1.6mA

Note:

- *1 Output is high-impedance (Hi-Z) + pull-up resistor (53k Ω typ.) during power-on, reset input, and display internal initialization. Pull-up resistor is connected to internal power (3.3V).
- *2 Pull-up resistor for SDA, SCL are connected to internal power (3.3V).

General purpose I/O port and power 3.3V

Measuring conditions: ambient temperature = 25 °C, VCC=5.0VDC

Parameter		Symbol	Min.	Тур.	Max.	Unit	Condition
	Logic input current	lilH	-	-	1.0	μADC	-
	Port 0,1,2,3	lilL	ı	-	-200	μADC	Ī
General-purpose	Logic input voltage	ViIH	2.4	-	3.3	VDC	ı
I/O port	Port 0,1,2,3 Logic output voltage	VilL	0	-	0.8	VDC	-
		ViOH	2.8	-	-	VDC	liOHp = -200μA
Port 0,1,2,3		ViOL	-	-	0.4	VDC	liOLp = 1.6mA
Power 3.3V	Logic output voltage 3.3V	VpOH	3.0	_	3.6	VDC	IpOHp = -20mA

Note:

Power 3.3V is used for internal logic, so external noise injection must be avoided to prevent product malfunction.

General purpose I/O port and power 3.3V output permissible current

Measuring conditions: ambient temperature = 25 °C, VCC=5.0VDC

Parameter		Symbol	Min.	Тур.	Max.	Unit	Condition
	Output permissible	liOHp	0	-	-5	mADC	-
General-purpose	current port 0,1,2,3 (Single port)	liOLp	0	-	5	mADC	-
I/O port	Output permissible current port 0,1,2,3	liOHt	0	-	-80	mADC	Including power 3.3V (IpOHp)
	(Sum of all port)		0	-	80	mADC	1
Power 3.3V	Output permissible current 3.3V (Single port)	ІрОНр	0	-	-20	mADC	-

Note:

Output current should not exceed the above values.

Please be sure to add a current limiting resistor in the output line if driving an LED or other device that may otherwise draw excessive current.

Power supply condition

Measuring conditions: ambient temperature = 25 °C, VCC=5.0VDC, IiOHt=0mA

Parameter	Symbol	Min.	Тур.	Max.	Unit	Condition
	ICC-1	ı	600	780	mADC	Brightness 100% All black display
Power supply current	ICC-2	ı	400	-	mADC	Brightness 50% All white display
1	ICC-3	-	230	300	mADC	Display power OFF
	ICC-4	-	45	65	mADC	Sleep mode Wakeup on GPIO
Power consumption	P-1	-	3.0	3.9	W	Brightness 100% All black display
	P-2	ı	2.0	-	W	Brightness 50% All white display
	P-3	-	1.2	1.5	W	Display power OFF
	P-4	ı	0.2	0.3	W	Sleep mode Wakeup on GPIO

Note:

The rise time of supply voltage should not exceed 100ms.

Inrush current at power-on may exceed twice normal current.

Regarding power mode, refer to "General Function" Software Specification: Power Saving Mode" command.

3 Environmental Specifications

Operating temperature: -30 to +70 °C Storage temperature: -30 to +70 °C

Operating humidity: Temp. ≤ 60 °C, 80% RH MAX. (No condensation)

Temp. > 60 °C, Absolute humidity shall be less than 80% RH at 60 °C

(No condensation)

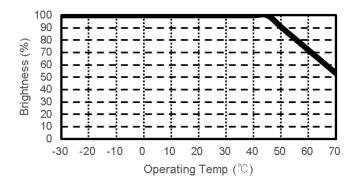
Storage humidity: Temp. ≤ 60 °C, 80% RH MAX. (No condensation)

Temp. > 60 °C, Absolute humidity shall be less than 80% RH at 60 °C

(No condensation)

Vibration (non-operating): 10-55-10Hz, all amplitude 1mm, 30 minutes, X-Y-Z Shock (non-operating): 392m/s² (40G) 9ms X-Y-Z, 3 times each direction

Brightness derating:



4 Optical Specifications (at 25°C)

LCD type: Transmissive TFT

Brightness TFT with touch panel: Typ. 300 cd/ m² (nit) 50% brightness

Min. 350 cd/ m² (nit) Typ. 600 cd/ m² (nit) 100% brightness

(White screen at the center of display)

Color: Max.65K colors
View direction: 12 o'clock
Gray scale inversion direction: 6 o'clock

5 Physical Specifications

Number of pixels: $800 \times RGB \times 480$

Display area: 154.08mm × 85.92mm (Diagonal 7.0 inches)

Pixel pitch: 0.1926mm × 0.179mm
Weight: Approximately 273g

6 Applicable Specifications

Applicable reliability specification: TT-99-3102x
Applicable production specification: TT-98-3413x
Applicable touch panel production specification: TT-17-3301x

7 Interface Details

USB, UART, I²C, and SPI serial interfaces are included on this module. The module will accept data from any configured interface. Data is transmitted using the most-recently active interface.

Caution is therefore needed if using more than one interface at the same time, as the interface may change, automatically. For details, please refer to 7.3 Transmit Data Interface.

7.1 USB Interface (CN3)

7.1.1 USB Interface – Summary

The USB interface is USB 2.0 high-speed (480Mbps) / full-speed (12 Mbps) capable.

The display module can be used as a WinUSB device, using the standard WinUSB driver.

Alternatively, refer to USB Interface – Technical details (below) if using the USB interface with a custom driver or embedded system, etc.

Refer to the USB 2.0 Specification (http://www.usb.org/developers/docs/usb20_docs/) for further details.

7.1.2 USB Interface - Technical Details

The device has a single configuration, with a single interface, supporting two endpoints for data transfer:

Endpoint	Type	Maximum packet size
Endpoint 0	Control	64 bytes
Endpoint 1	Bulk IN	Full speed: 64 bytes, high speed: 512 bytes
Endpoint 2	Bulk OUT	Full speed: 64 bytes, high speed: 512 bytes

Vendor ID: 0EDA (hex)
Product ID: 1200 (hex)

Device class and interface class: FF (hex) (vendor-specific) USB serial number: Unique serial number

WinUSB compatibility:

Firmware supports *Microsoft OS String Descriptors*, which enable automatic recognition of *WinUSB* compatibility for applicable operating systems (manual configuration, using an .inf file, is also possible). The Device Interface GUID reported by the device is {6120D798-D192-4463-B0DE-2B65ED2F4870}. This GUID is used by applications on the host in order to access the device.

7.2 Serial Interface (CN9)

Serial interface mode must be set using jumpers J5 and J6. For all modes, the DTR signal reflects the state of the receive buffer. This can be used for flow control if necessary. Data received is stored in the internal receive buffer, and processed in order of receipt. The TRDY signal indicates whether or not there is data currently held in the transmit buffer.

Buffer capacity

Receive buffer	2,047 bytes
Transmit buffer	2,046 bytes

DTR signal change timing

DTR change	$L'(READY) \rightarrow H'(BUSY)$	'H'(BUSY) → 'L'(READY)
Receive buffer space	62 bytes or less	128 bytes or more

TRDY signal change timing

TRDY	READY('H')	EMPTY('L')
Condition	Data in transmit buffer	No data in transmit buffer

Data can be received up to the capacity of the receive buffer, but it is recommended, generally, to not send data when the SBUSY / DTR signal indicates BUSY.

If there is no valid data in the transmit buffer (the TRDY signal indicates EMPTY), invalid data (FFh) is sent in response to a read data sequence (for SPI or I²C).

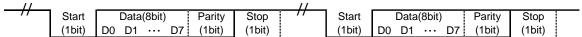
7.2.1 UART Mode (J5 = SHORT, J6 = SHORT)

Interface conditions:

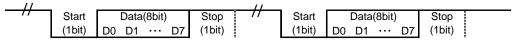
Baud rate	4,800 to 115,200bps (set by jumper and memory SW) Default setting: 38,400bps
Parity	None, even, odd (set by memory SW) Default setting: None
Format	Start (1 bit) + data (8 bit) + parity (0 or 1 bit) + stop (1 bit)
Communication control signal	DSR, DTR, TRDY

- Data transmitted from the display is placed in the internal transmit buffer and sent, in order, when SBUSY/DSR = READY.
- The TRDY signal does not need to be used.

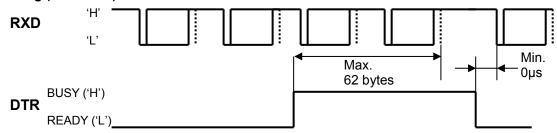
Data Frame (When using parity bit)



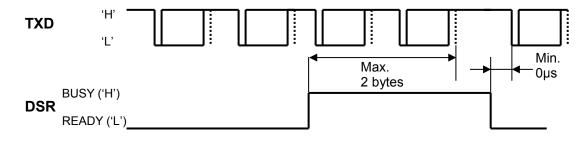
Data Frame (When parity bit is not used)



Timing (data write)



Timing (data read)



7.2.2 SPI Mode (J5 = OPEN, J6 = OPEN)

Display module operates as an SPI slave; data is sent and received in response to host (master) operations.

SSEL= $1 \rightarrow 0 \rightarrow 1$ is one command sequence.

1st byte	Operation mode
44h	Data write (Host → Module)
54h	Data read (Host ← Module)
58h	Status read (Host ← Module)

Communication Parameters

Baud rate	Max. 8.3Mbps
Format	SPI
Communication	SBUSY, TRDY
control signals	

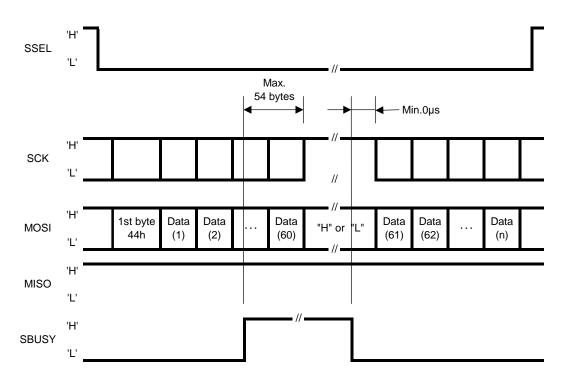
- The TRDY signal may be monitored, but the host (master) must still use the Status Read sequence before the Data Read sequence.
- The SBUSY signal can be monitored directly or via the Status Read sequence.

Data Write

When 44h is input as the first byte, the module receives the 2nd and subsequent bytes as data.

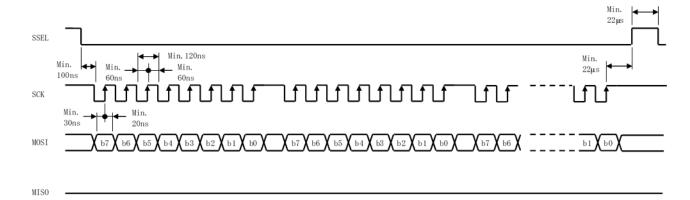
	1st byte	2nd byte	3rd byte	 n+1 byte
MOSI	44h	Data(1)	Data(2)	 Data(n)
MISO	-	-	-	 -

Timing (data write, SBUSY)



If using Status Read sequences to monitor SBUSY, send no more than 54 bytes at a time.

Timing (detail of data write)



Data Read

When 54h is input as the first byte, the module outputs valid data on the 3rd and subsequent bytes. The host must read the number of bytes reported by the immediately preceding Status Read command. The number of bytes **reported by the** status read command **will be transmitted, with any unread bytes discarded.**

	1st byte	2nd byte	3rd byte	 m+2 byte
MOSI	54h	-	-	 -
MISO	-	00h	Data(1)	 Data(m)

m: The number of data bytes reported by the Status Read command(TL of status byte).

Status Read

When 58h is input as the first byte, the module outputs status data. For the 3rd and any subsequent bytes, the most recent status data is provided.

	1st byte	2nd byte		n byte
MOSI	58h	-		-
MISO	-	Status	Status	Status

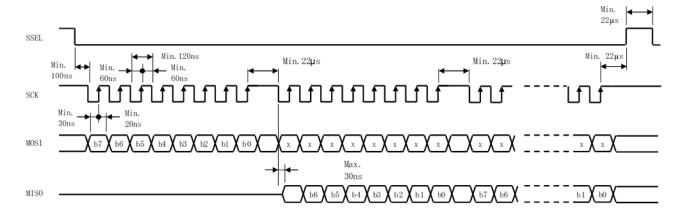
Status bit assignment

b7	b6	b5	b4	b3	b2	b1	b0
SBUSY	0*	TL(b5)	TL(b4)	TL(b3)	TL(b2)	TL(b1)	TL(b0)

SBUSY: SBUSY signal

TL : Number of transmit data bytes available (maximum 63 bytes)

Timing (data read, status read)



^{*:} If b6 is 1, the status byte is invalid.

7.2.3 I²C Mode (J5 = SHORT, J6 = OPEN)

Slave address is set by jumpers J0 and J1.

J0	J1	Function
OPEN	OPEN	I ² C slave address = 50h
SHORT	OPEN	I ² C slave address = 51h
OPEN	SHORT	I ² C slave address = 52h
SHORT	SHORT	I ² C slave address = 53h

Note: Module does not respond to the general call address (00h).

Communication parameters

Baud rate	Max. 400kbps
Format	I ² C
Slave address	Set by J0 and J1 (Default setting: 50h)
Supported functions	ACK response, clock stretch
Communication control signals	SBUSY, TRDY, clock stretch

^{*}Note: If clock stretch is applied during processing of a command, the host (master) will not be able to send or receive any more data until command processing has finished.

If TRDY = EMPTY, FFh is transmitted from the module in response to a read sequence. In addition to the Clock stretch function, flow can also be controlled by monitoring the SBUSY signal. SBUSY signal changes according to the receive buffer state. The host should send data when SBUSY=READY (refer to 7.2 Serial Interface (CN9)).

Data Write sequence

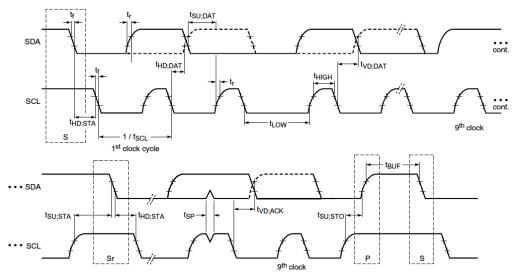
S	SLAVE ADDRESS		R/*W	DATA		A CIK	ACK ···	DATA			A CIV	D			
(Sr)	b7		b1	b0	ACK	b7		b0	ACK		b7		b0	ACK	Р

Data Read sequence

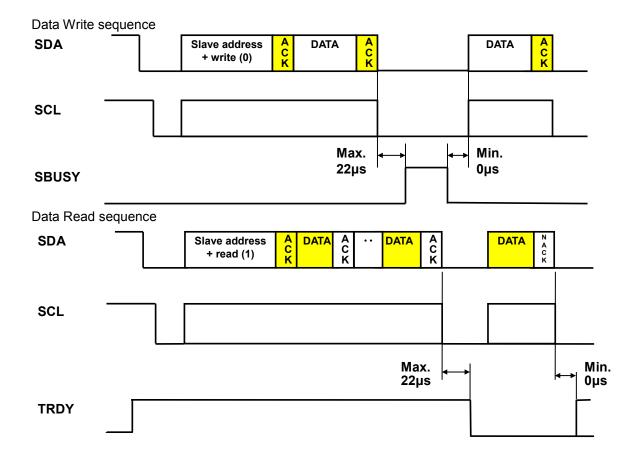
s	SLAV	E ADDF	RESS	R/*W	4014		DATA		4014		DATA		NACK	D
(Sr)	b7		b1	b0	ACK	b7		b0	ACK	 b7		b0	NACK	Р

	Host (master) is transmitter, display module (slave) is receiver
	Host (master) is receiver, display module (slave) is transmitter

I²C Timing



Parameter	Symbol	Condition	Min.	Тур.	Max.	Unit
SCL clock frequency	fscL	-	0	-	400	kHz
Start condition hold time	thd;sta	-	0.6	_	-	μs
SCL 'L' time	tLOW	-	1.3	-	-	μs
SCL 'H' time	tніgн	-	0.6	_	-	μs
Start condition setup time	t su;sta	-	0.6	-	-	μs
Data hold time	thd;dat	-	0	-	-	μs
Data setup time	tsu;dat	-	100	-	-	ns
SCL, SDA rise time	t_r	-	20	-	300	ns
SCL, SDA fall time	t _f	-		-	300	ns
Stop condition setup time	t su;sто	-	0.6	-	-	μs
Stop condition – start condition bus idle time	t BUF	-	20	-	-	μs



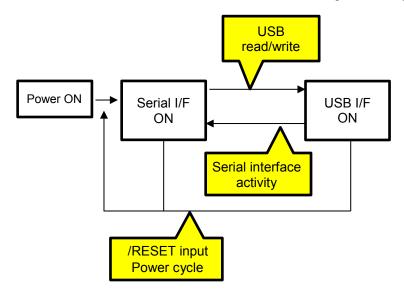
7.3 Transmit Data Interface

The serial interface is selected as the interface through which data is sent when the power is turned on or by an external reset. After that, the interface will automatically switch, as necessary in response to interface activity, as outlined below;

Data destination (Transmit Data Interface) switching conditions

Data Destination		Switching Condition		
USB		Receive USB Read(endpoint 1:Bulk IN) or		
		Receive USB Write(endpoint 2:Bulk OUT)		
Serial Interface	UART Mode	Receive Data		
	SPI Mode	Receive Data Write, Data Read, Status Read		
	I ² C Mode	Receive Slave Address + R/W		

- *Be careful if using multiple interfaces at the same time.
- If the data destination switching condition is met while there is data remaining in the transmit buffer, the data in the transmit buffer will be sent through the newly-selected interface.

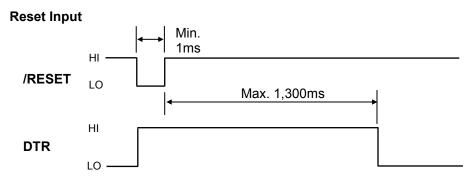


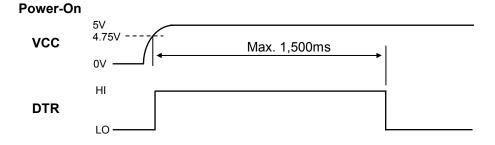
7.4 Reset

This product can be reset by inputting a LO signal to /RESET.

Note:

After releasing /RESET, there is a delay, as shown below, before the module is ready to receive data. The DTR signal should be monitored to confirm that data is able to be received. Output is high-impedance (Hi-Z) + pull-up resistor (53k Ω typ.) during power-on, reset input, and display internal initialization.





Note: At start-up, if the Memory Switch has been set to run the GUI application automatically, the time after the DTR/SBUSY signal goes LO is used for internal data transfer and initialization (for Page, Object, and Font data, etc). Data can be received during this time, but command and data processing does not start until the initialization is complete.

8 Touch Panel

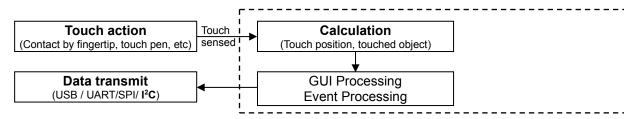
8.1 Outline

Detection method: MPCT (Metallized Projective Capacitive Touch)

Material: Glass

8.2 Basic Operation

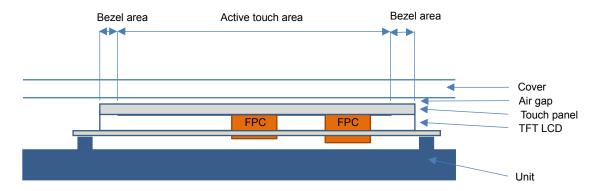
The display module features a touch panel for handling input by fingertip or touch pen, etc. The touch panel function sends data for the input position or operation of user-defined switch buttons.



Refer to "General Function" Software Specification for details.

9 Installation Method

touch panels are made of glass. When using this product, please be sure to install a protective overlay such as cover glass, acrylic plate, etc. Since this touch panel is capacitive type, touch won't work if a conductive material is placed on the touch area or bezel area. Please use non-conductive material like a glass or acrylic panel as a cover. An example is shown below.



Installation example

- Because edges and corners are sharp of touch panel, please be careful with installation.
- If it gives a strong shock it may cause destruction.
- Do not hold a cable (FPC) of touch panel. Also, do not install such as to stress the cable.
- Please handle this product carefully because it is a precision part. When holding this product, please touch PCB edge, not touch panel.

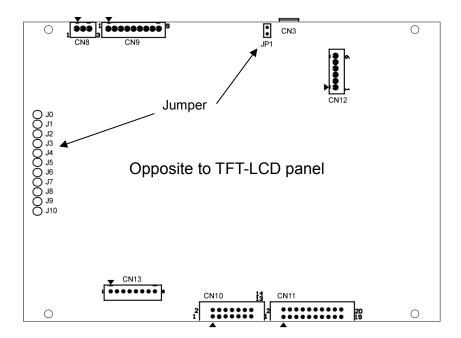
10 Setup

10.1 Jumper

Jumper	Function	Default
· · ·	T dilotion	
J0	l ² C slave address	Open
J1	I-C slave address	Open
J2	Reserved	Open
J3	Baud rate	Open
J4	bauu rate	Open
J5	Serial interface (CN9) mode	Open
J6	Serial interface (Cive) mode	Open
J7	GUI Start selection	Open
J8	Reserved	Open
J9	Reserved	Open
J10	Reserved	Open

Open = "H", Short = "L"

Refer to software specification for jumper setting details.



11 Connectors

11.1 USB Interface (CN3)

Pin No.	Signal name			
1	VBUS			
2	D-			
3	D+			
4	ID			
5	GND			

Shorting JP1 enables power supply from VBUS.

11.2 Power Through-holes (CN8)

Pin No.	Signal name	Function
1	VCC	Power supply (5V)
2	/TEST	No connection (Test mode) *1
3	GND	Ground

^{*1:} Test mode can be executed by shorting the /TEST terminal and GND. Refer to "General Function" Software Specification. Normally use it open.

11.3 Serial Interface & Power Through-holes (CN9)

orial interface of Ferrit Interface (Cite)						
Pin No.	Signal name			Function	Direction	
FIII INO.	UART	SPI	I ² C	Function	Direction	
1	/RESET	/RESET	/RESET	Reset	Input	
2	-	SCK	SCL	Signal clock	Input	
3	RxD	MOSI	SDA	Data receive	Input / Output	
4	DTR	SBUSY	SBUSY	Display busy	Output *1	
5	DSR	SSEL	-	Host busy	Input	
6	TXD	MISO	-	Data send	Output *1	
7	TRDY	TRDY	TRDY	Transmit ready	Output *1	
8	VCC	VCC	VCC	Power supply (5V)	-	
9	GND	GND	GND	Ground	-	

^{*1:} Output is high-impedance (Hi-Z) + pull-up resistor (53kΩ typ.) during power-on, reset input, and display internal initialization.

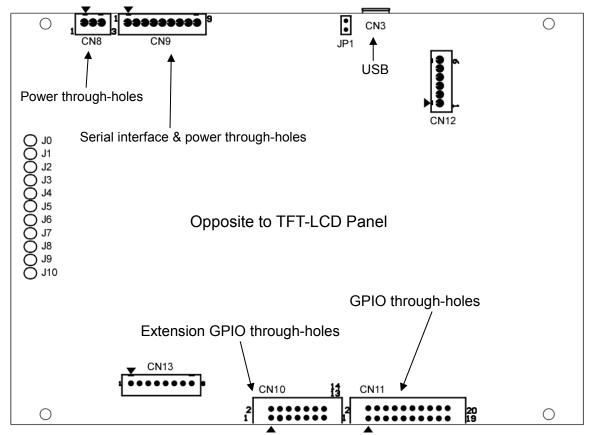
11.4 Extension General Purpose I/O Port Through-holes & Power Through-holes (CN10)

Pin No.	Signal name	Function	Direction	Pin No.	Signal name	Function	Direction	
1	VCC	Power supply (5V)	Input	2	3.3V	3.3V	Output	
3	GPIO 25	Port 3		4	GPIO 24	Port 3		
5	GPIO 23		Input / output		6	GPIO 22		
7	GPIO 21	Port 2		8	GPIO 20	Port 2	Input / output	
9	GPIO 19	POIL 2		10	GPIO 18	POIL 2		
11	GPIO 17			12	GPIO 16			
13	GND	Ground	Input	14	GND	Ground	Input	

11.5 General Purpose I/O Port Through-holes & Power Through-holes (CN11)

Pin No.	Signal name	Function	Direction	Pin No.	Signal name	Function	Direction
1	VCC	Power supply (5V)	Input	2	3.3V	3.3V	Output
3	GPIO 15			4	GPIO 14		
5	GPIO 13	Port 1		6	GPIO 12	Port 1	
7	GPIO 11	POIL I		8	GPIO 10	FUILI	
9	GPIO 9			Input / output	10	GPIO 8	
11	GPIO 7		Input / output	12	GPIO 6		Πρανοαιραι
13	GPIO 5	Port 0		14	GPIO 4	Port 0	
15	GPIO 3			16	GPIO 2	POILU	
17	GPIO 1		,	18	GPIO 0		
19	GND	Ground	Input	20	GND	Ground	Input

11.6 Connector Position



"▲" : 1pin mark.

12 **Memory SW**

The default settings for the Memory SW related to the touch panel are as follows.

For details of the Memory SW, refer to the "General Function" software specification.

MSW No.	Function	Valid range	Default
57	Continuous touch automatic adjustment function control 00h:Touch Package settings applied (Default: 10 seconds) 01h-05h: 5 seconds 06h-32h: 6 to 50 seconds 33h-FEh: Automatic adjustment OFF FFh:Touch Package settings applied (Default: 10 seconds)	00h – FFh	00h
58	Touch sensitivity (signal gain) setting	00h – 0Fh	06h
59	Touch sensitivity (threshold) setting	00h – FFh	50h
61	Touch scan period setting at power saving mode (ms)	05h(5ms) - FEh(254ms)	20h(32ms)
62	Touch sensitivity setting selection at startup 00h: Apply the setting values of MSW58 and 59 01h: Apply touch setting package value 02h: Signal gain	00h – 02h	00h
63	Touch setting package selection at startup 00h: Factory setting 01h: Touch setting package 1 02h: Touch setting package 2 03h: Touch setting package 3 04h: Touch setting package 4	00h – 04h	00h

Note: Module operates with default value if Memory SW value is outside the valid range.

13 **Lot No. / Firmware Version Specification**

Lot No. and firmware version are attached on the product. They are determined based on the following specifications.

Example:

Lot No. Firmware Ver. 24F22EH F100A ABCDE F

A: Production year The last two digits of the year are indicated.

B: Production month

January: A, February: B to December: L

C: Production date The production date is indicated by one or two digits.

D: Manufacturing factory Indicates the factory that was manufactured.

E: Omiva factory in Japan

E: Identification of RoHS compliant

H: RoHS compliant

F: Firmware version

The production month is indicated by one alphabetic character.

Indicates the identification of RoHS compliant products.

Indicates the firmware version.

In test mode and information read command, F100 may be

described as 1.00.

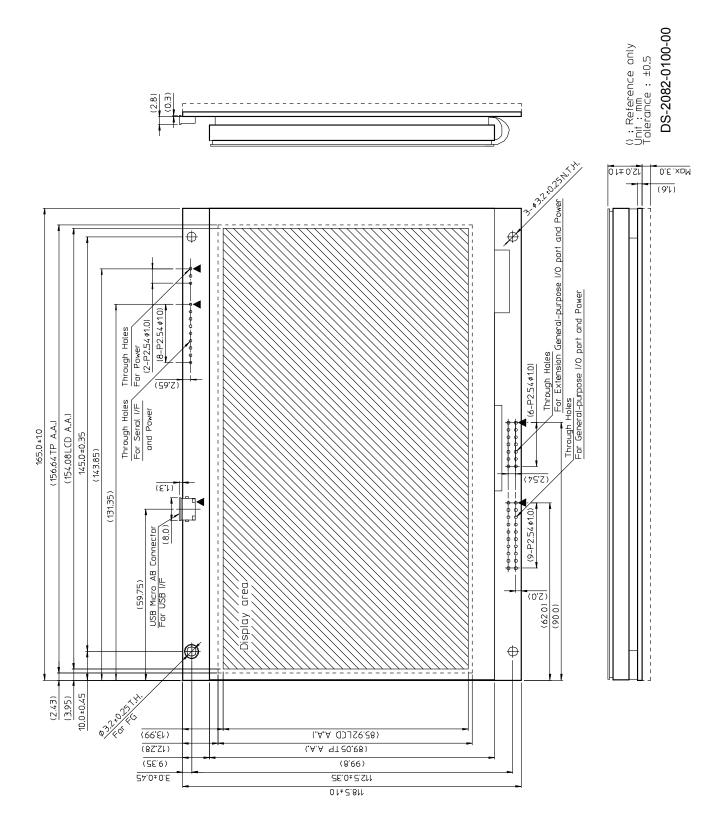
The alphabet indicates font versions.

First edition: A, 2nd edition: B, 3rd edition: C...

The example above is a RoHS compliant product with firmware version 1.00A manufactured at the Omiya Plant on June 22, 2024.

14 Physical Dimensions

Mounting holes are close to the panel; use caution when assembling.



Revision history

Revision history		_ ::
Specification number	Date	Revision
DS-2170-0001-00	June 25, 2024	Initial issue
DS-2170-0001-01	Sep. 11, 2024	7.2 Serial Interface(CN9) DTR signal change timing SPI Change "54 bytes or less" to "62 bytes or less" TRDY signal change timing "If there is" Add "(for SPI or I²C)" 7.2.2 SPI Mode Change "When confirming the SBUSY" to "If using Status Read" 10.1 Jumper Change the chart 11.6 Connector Position Change the chart

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